A Study of the Movement of Moisture in and from Concrete at Elevated and Non-Uniform Temperatures.

Chapman, D. A

A STUDY OF THE MOVEMENT OF MOISTURE IN AND FROM CONCRETE AT ELEVATED AND NON-UNIFORM TEMPERATURES.

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by

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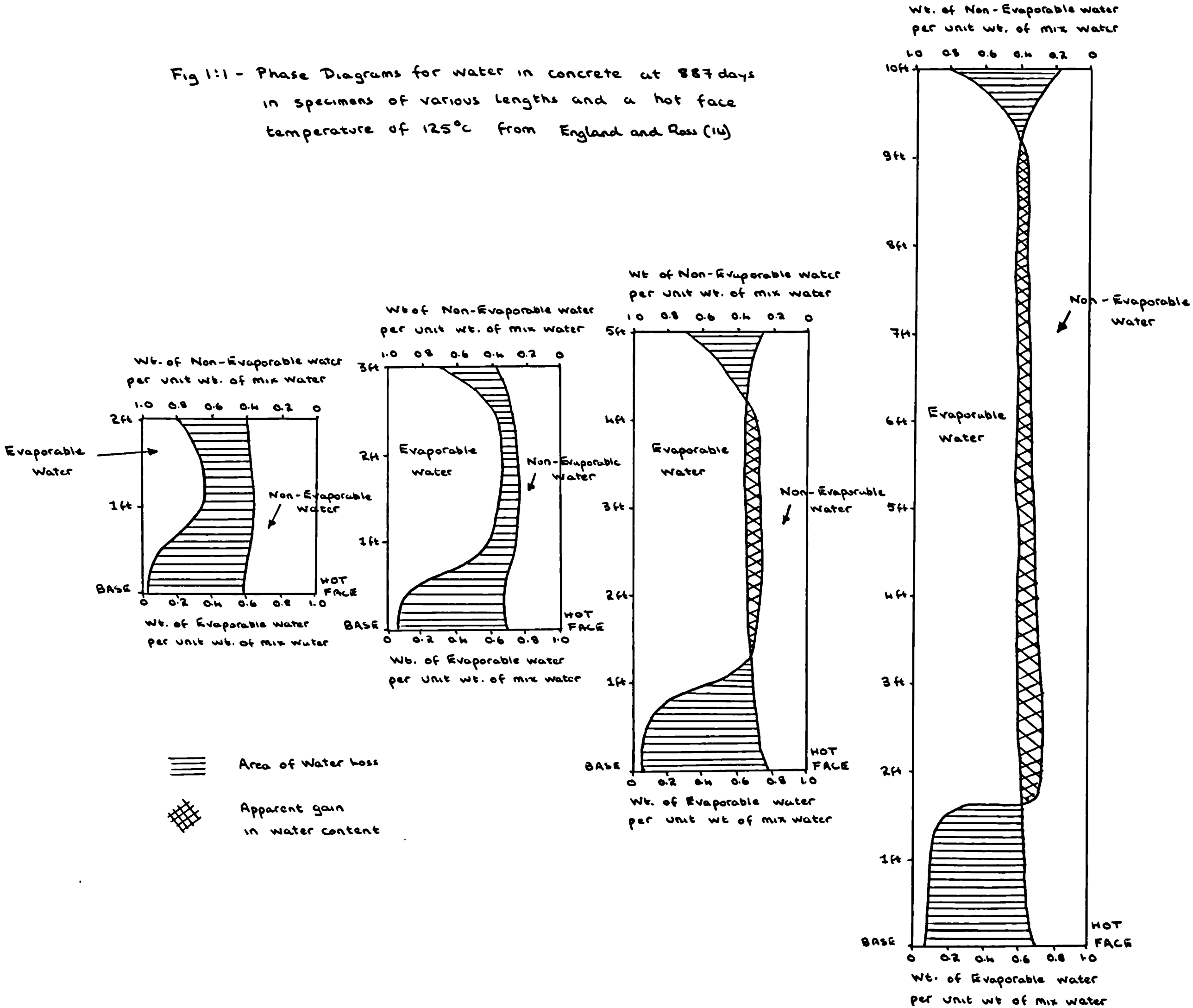
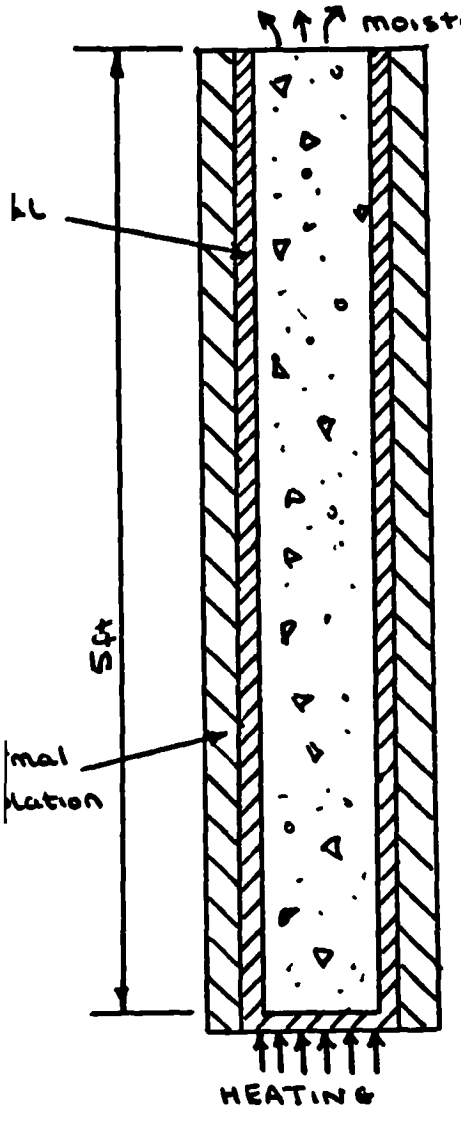




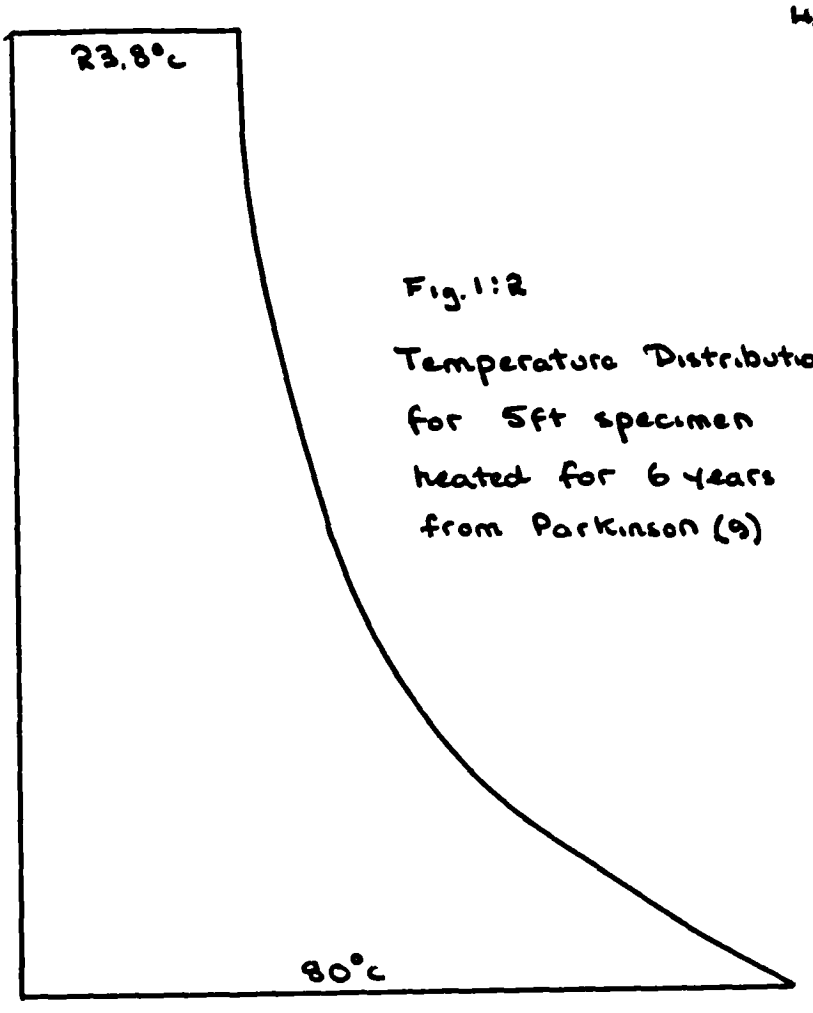
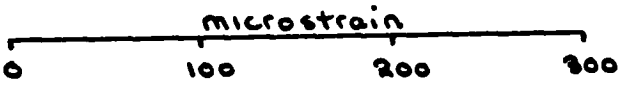
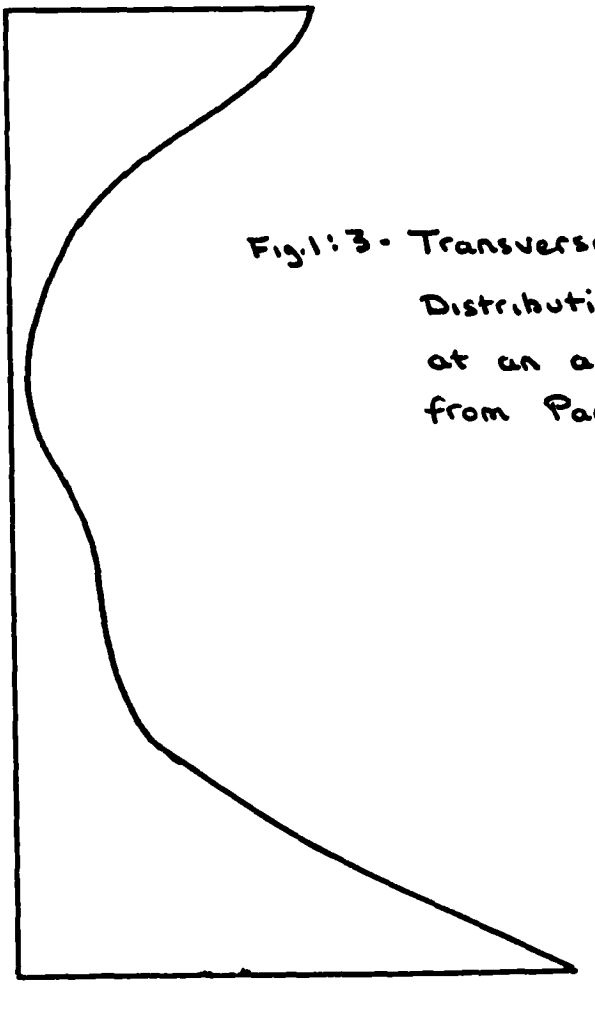


Fig. 1:2
Temperature Distribution for 5ft specimen heated for 6 years from Parkinson (9)





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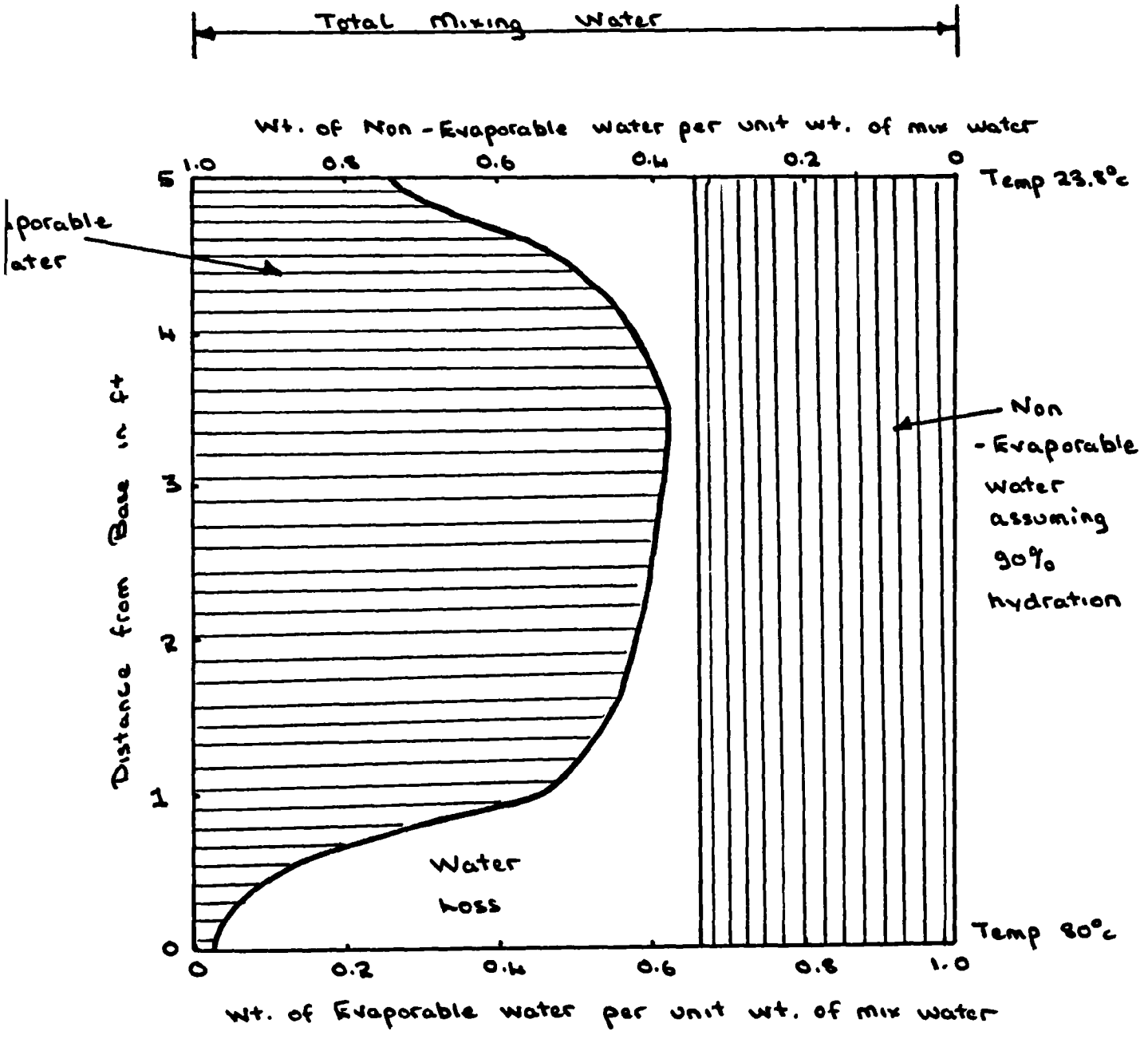

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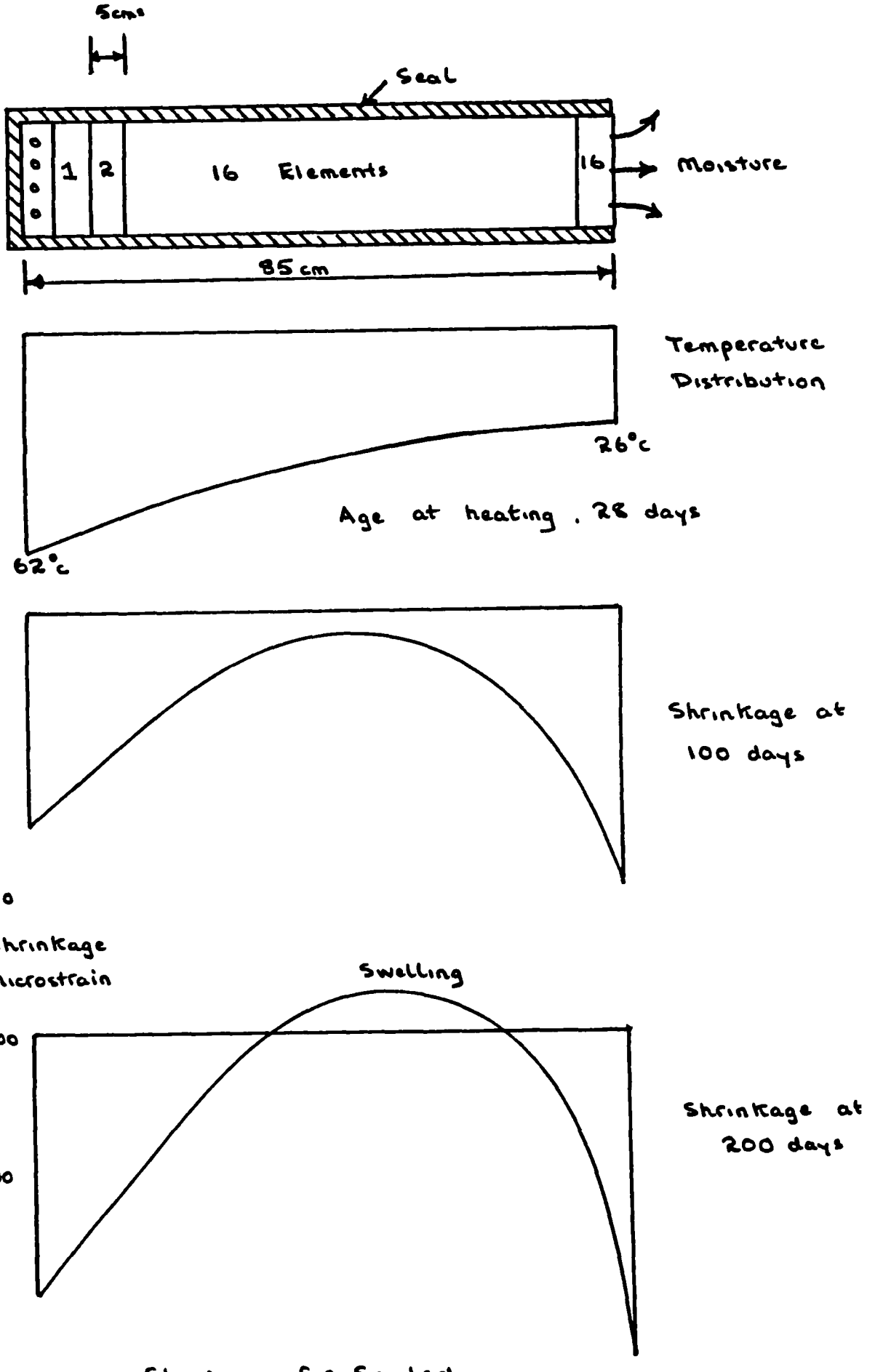

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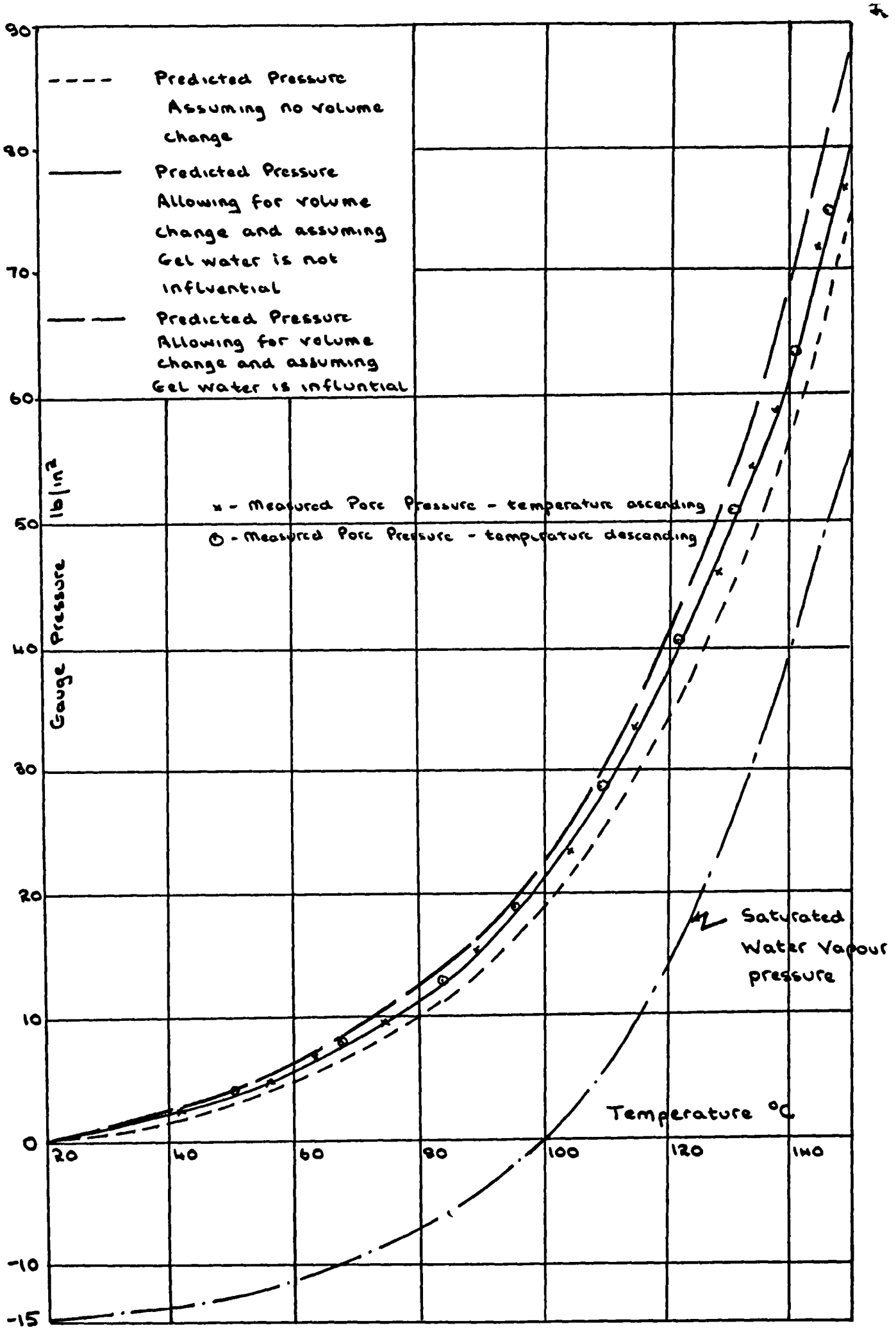

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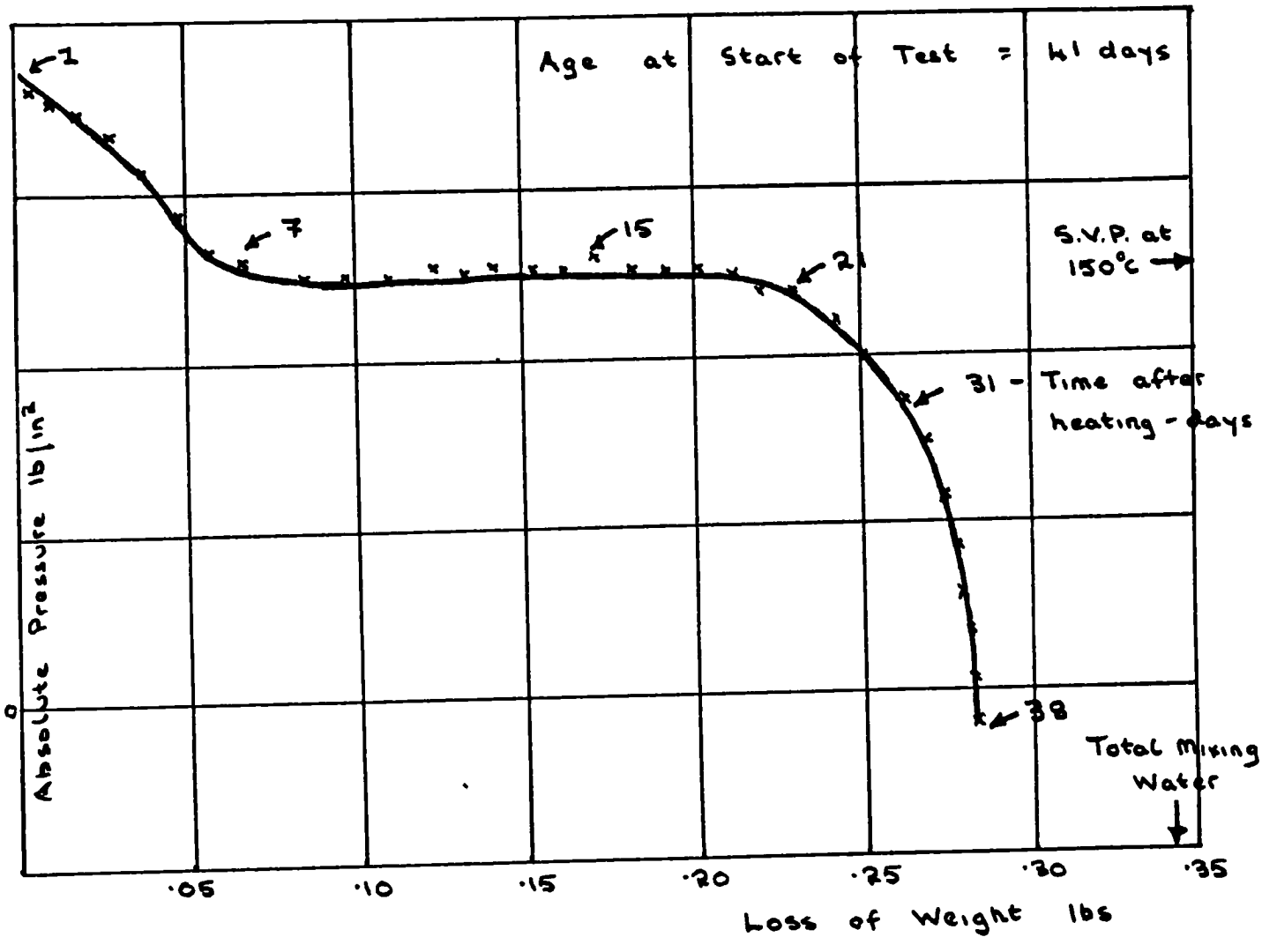

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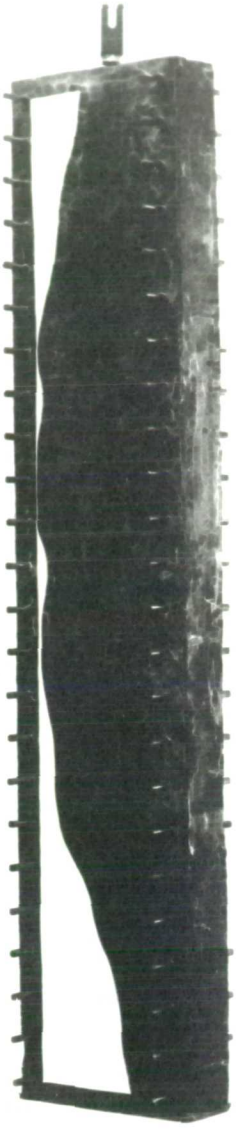


PLATE I : 1.

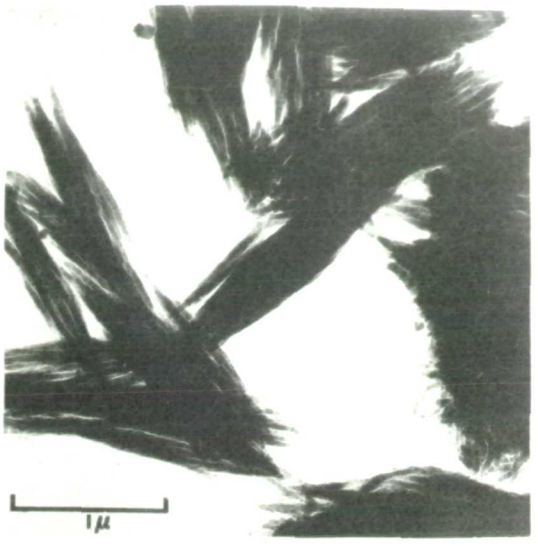


PLATE II : 1.

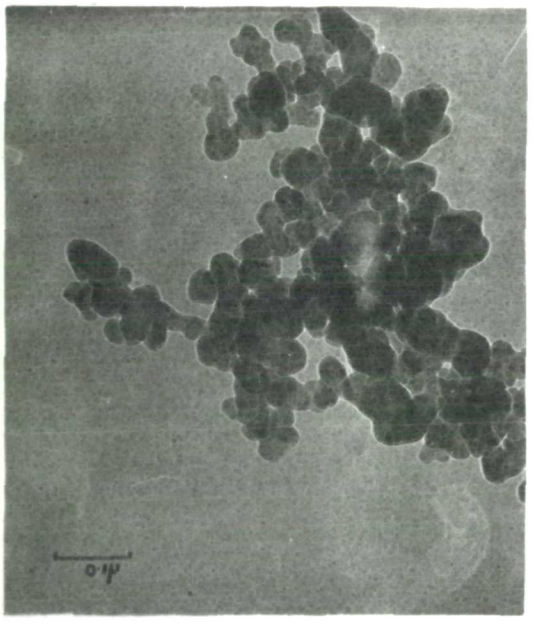
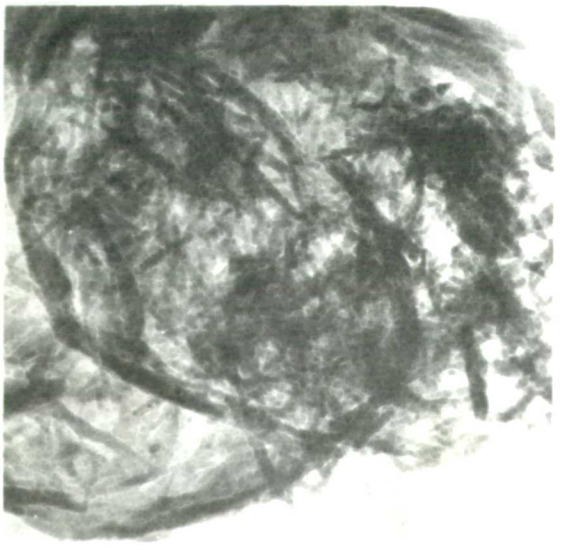


PLATE II : 2.



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FIGURES FOR CHAPTER TWO.

PHOTOGRAPHS FOR CHAPTER TWO.

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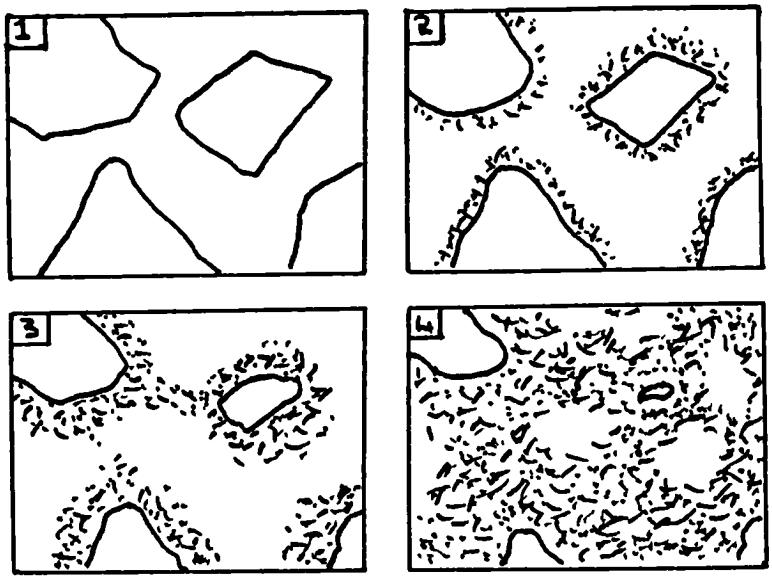

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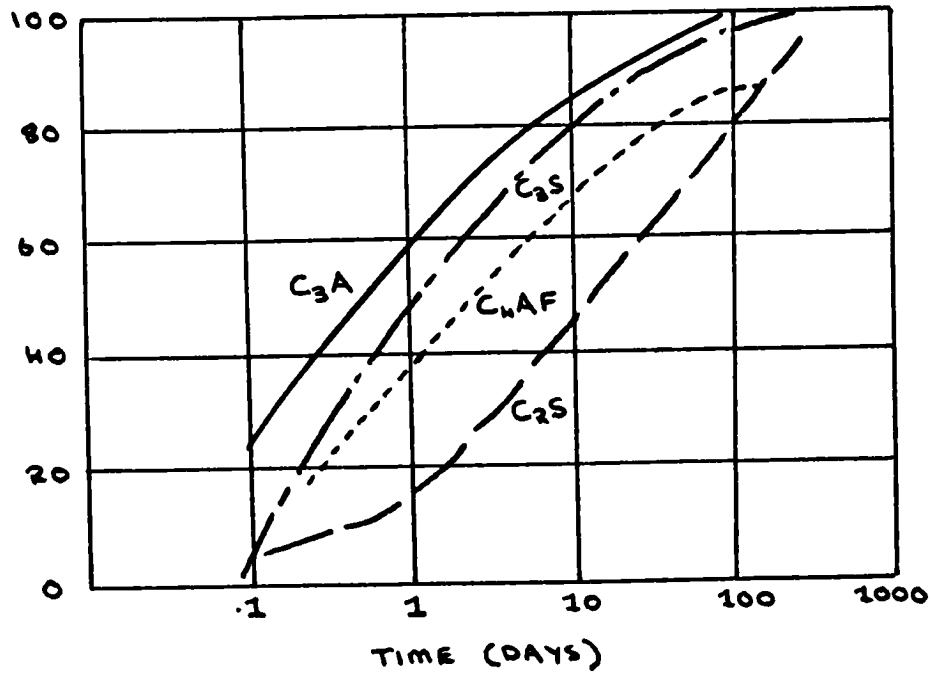

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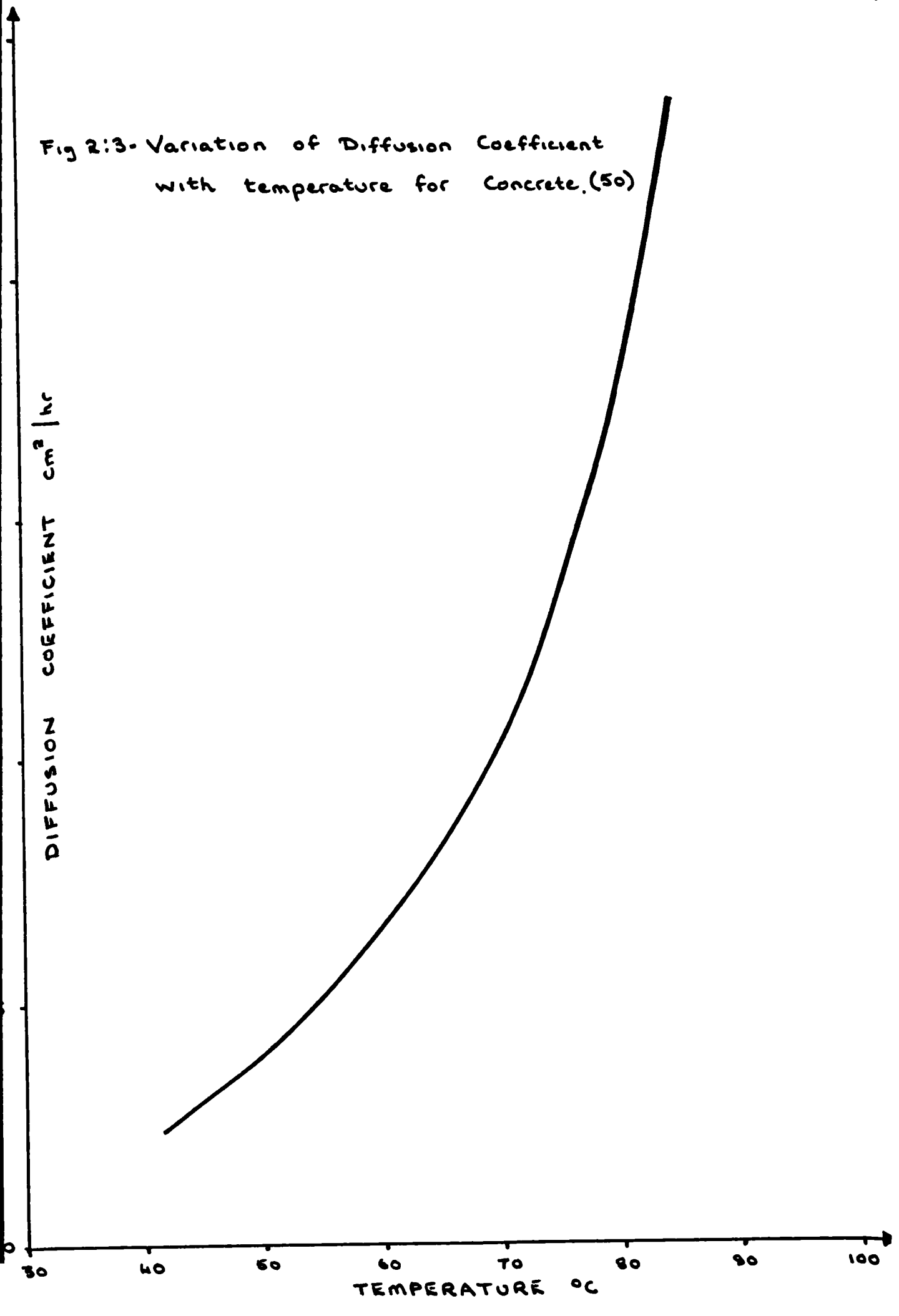

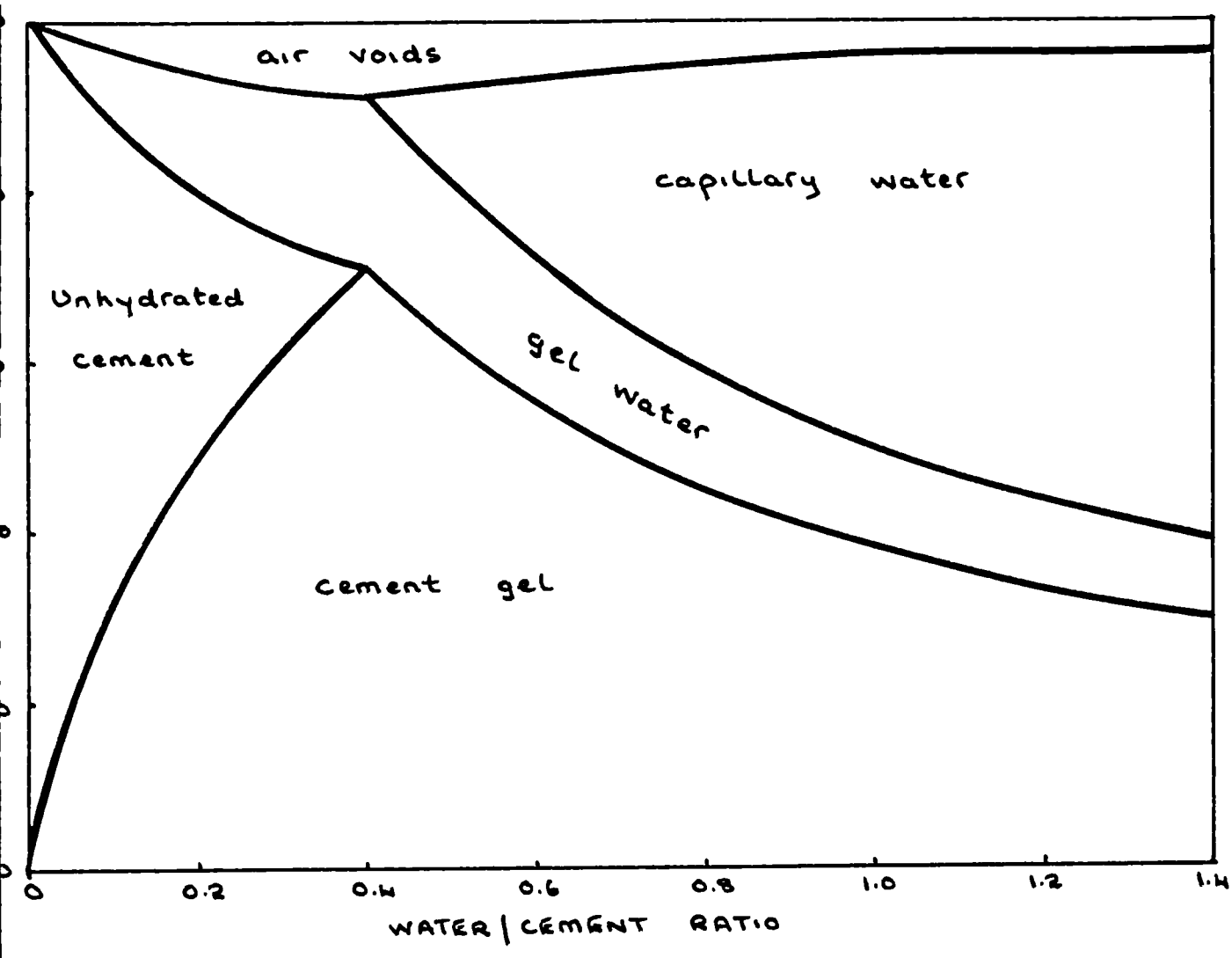

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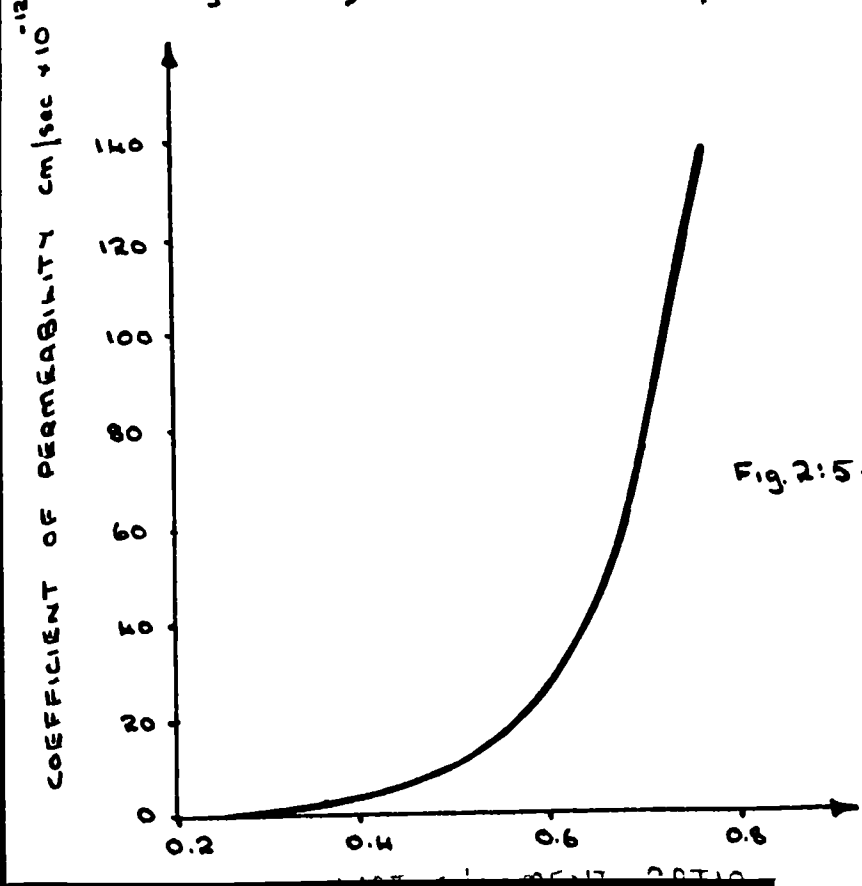

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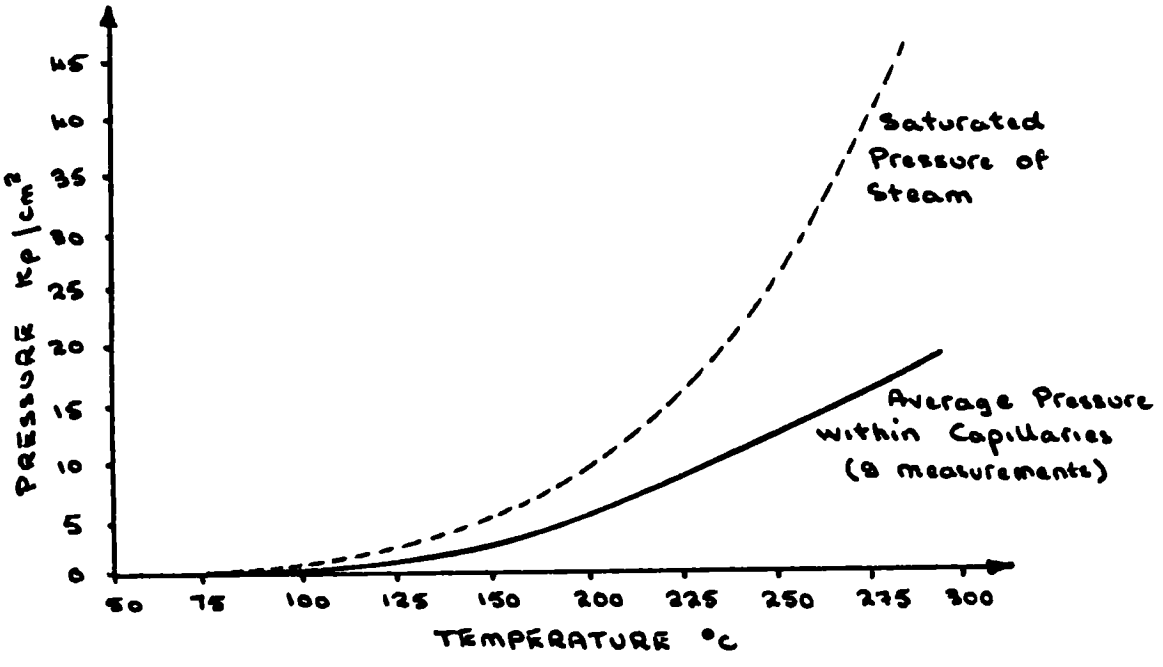

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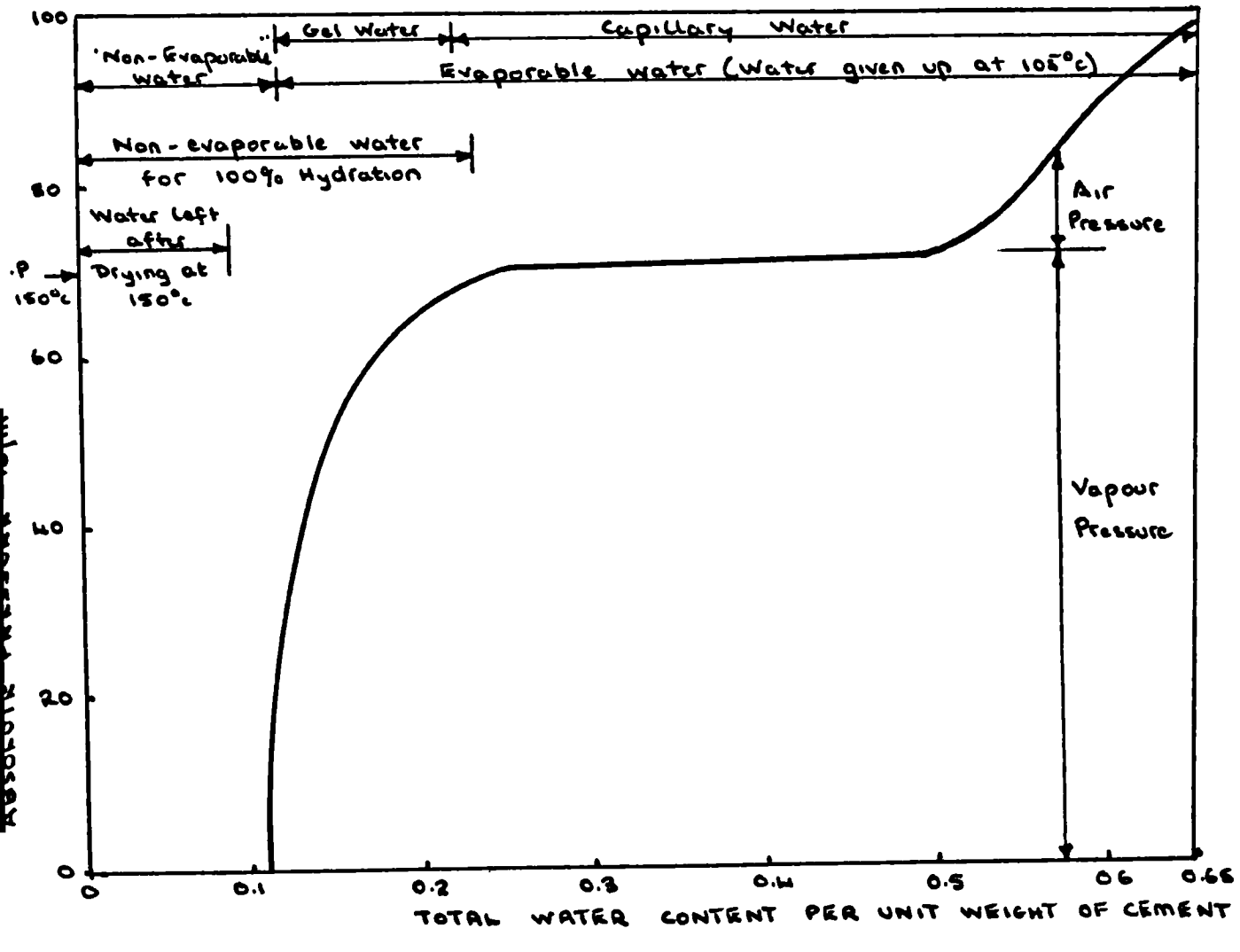

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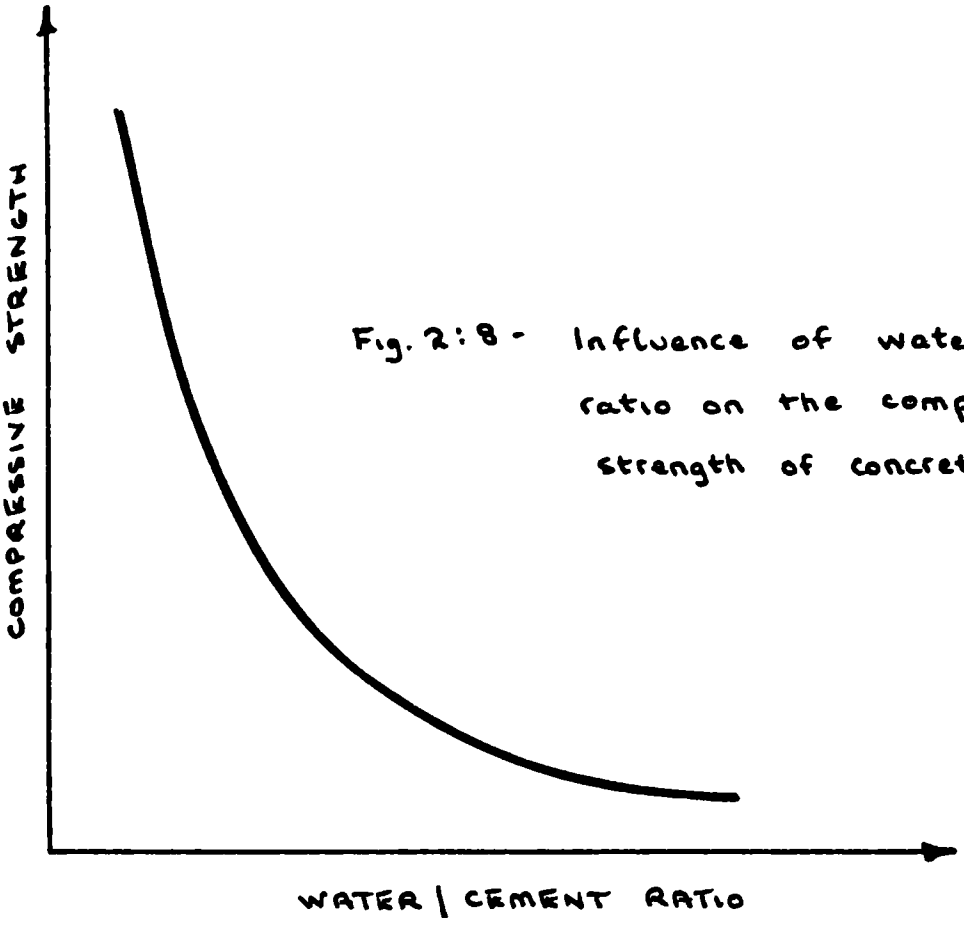

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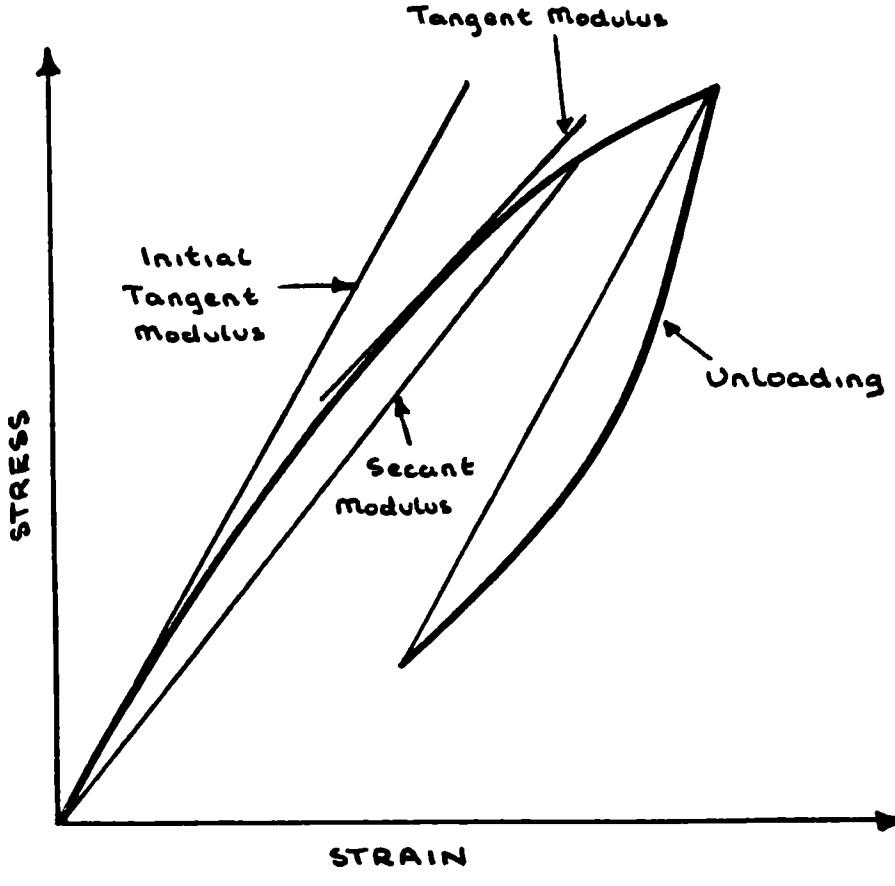

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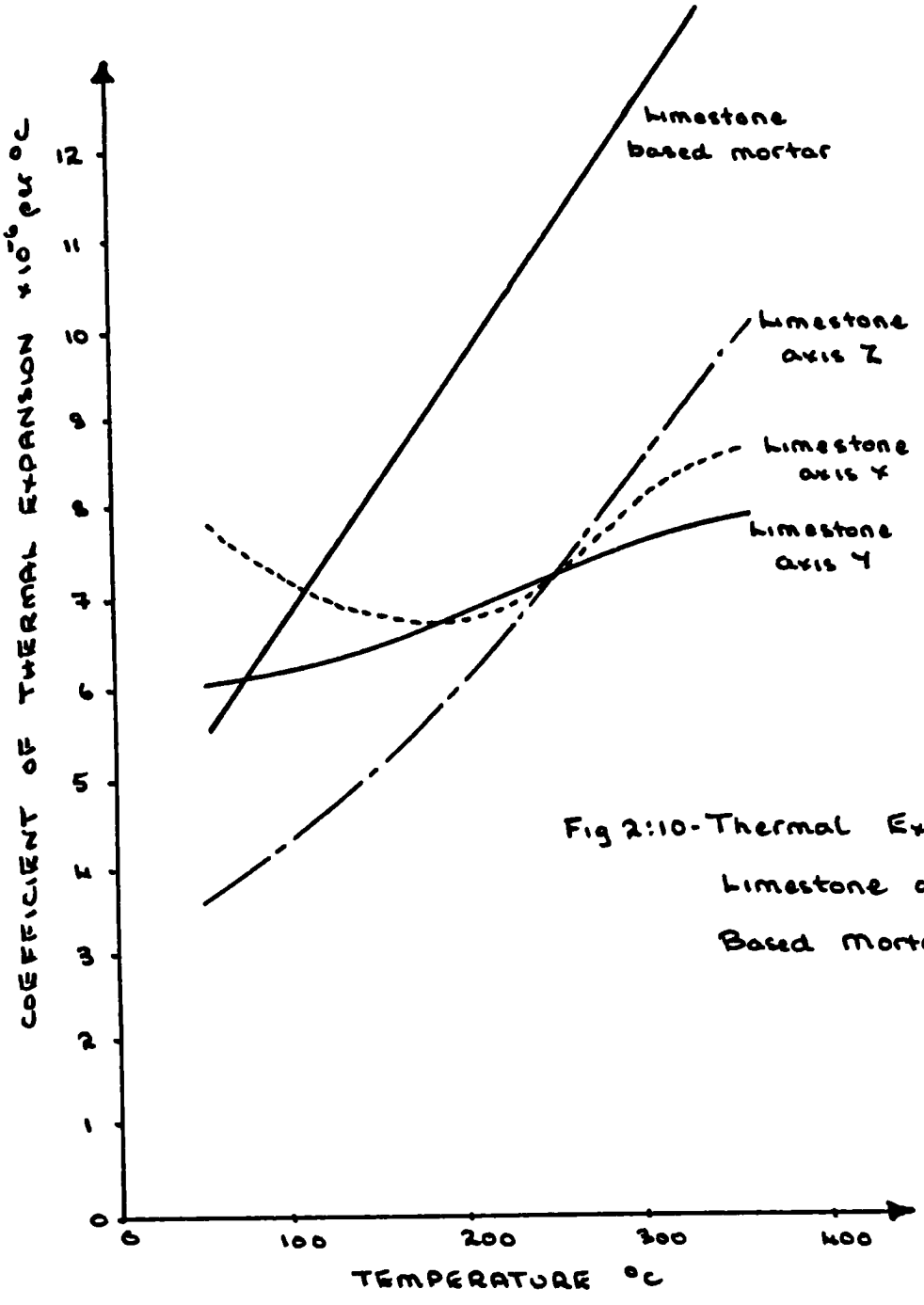

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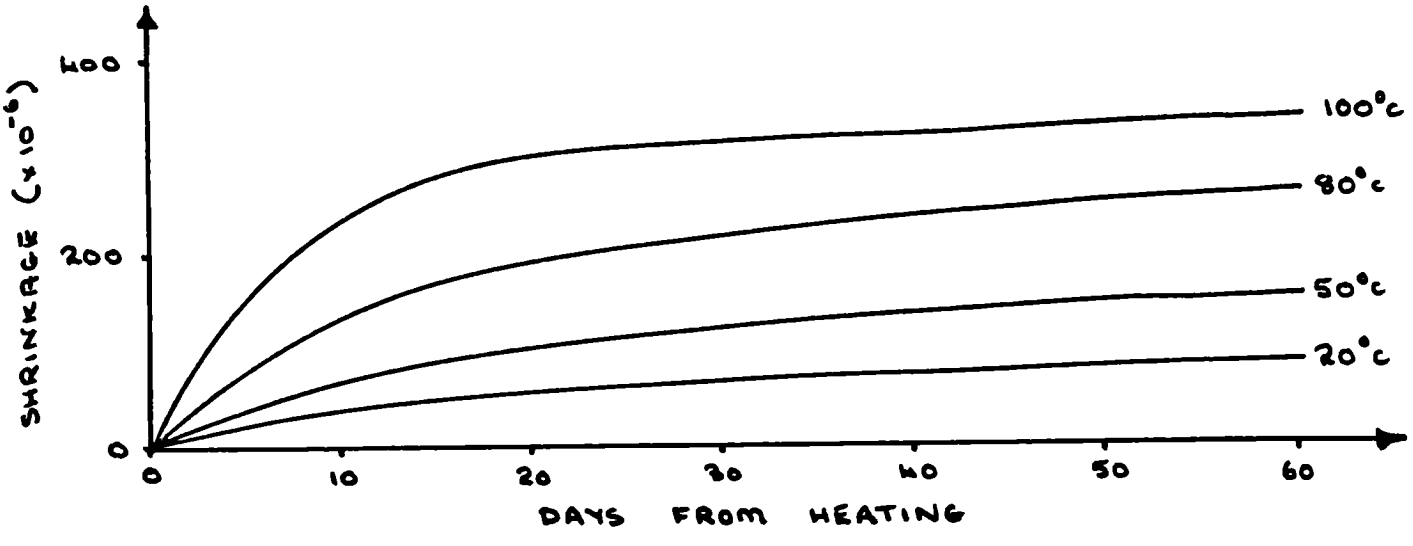

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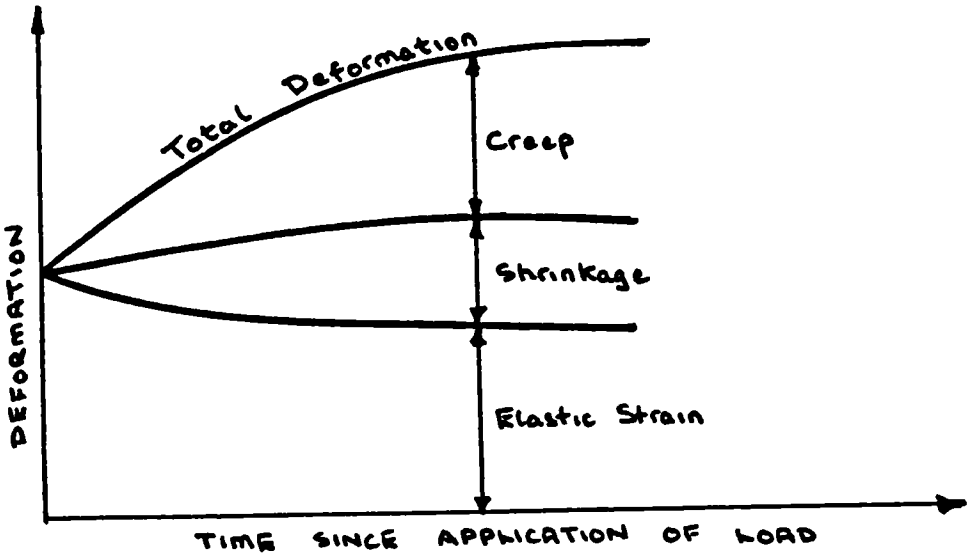

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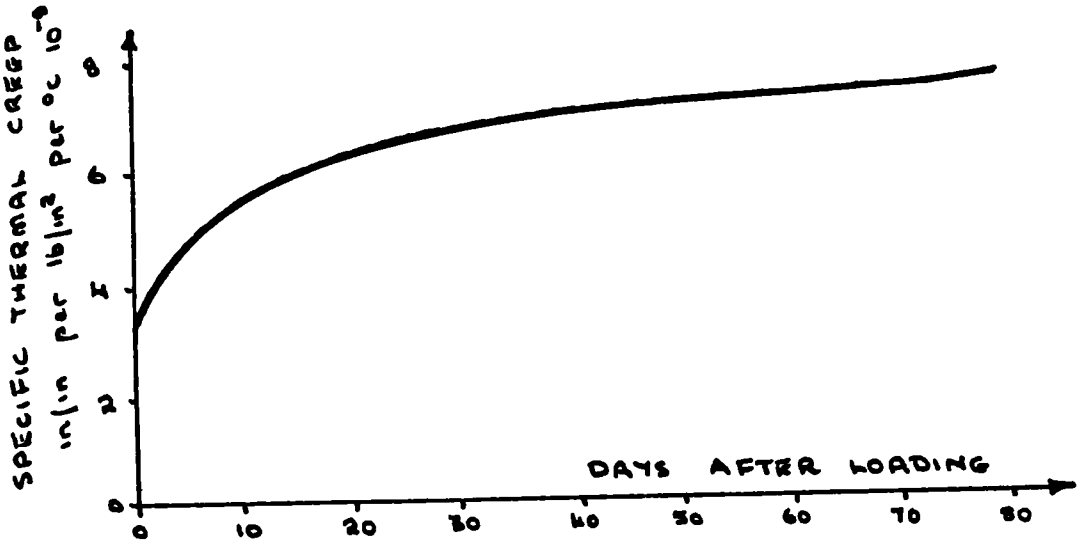

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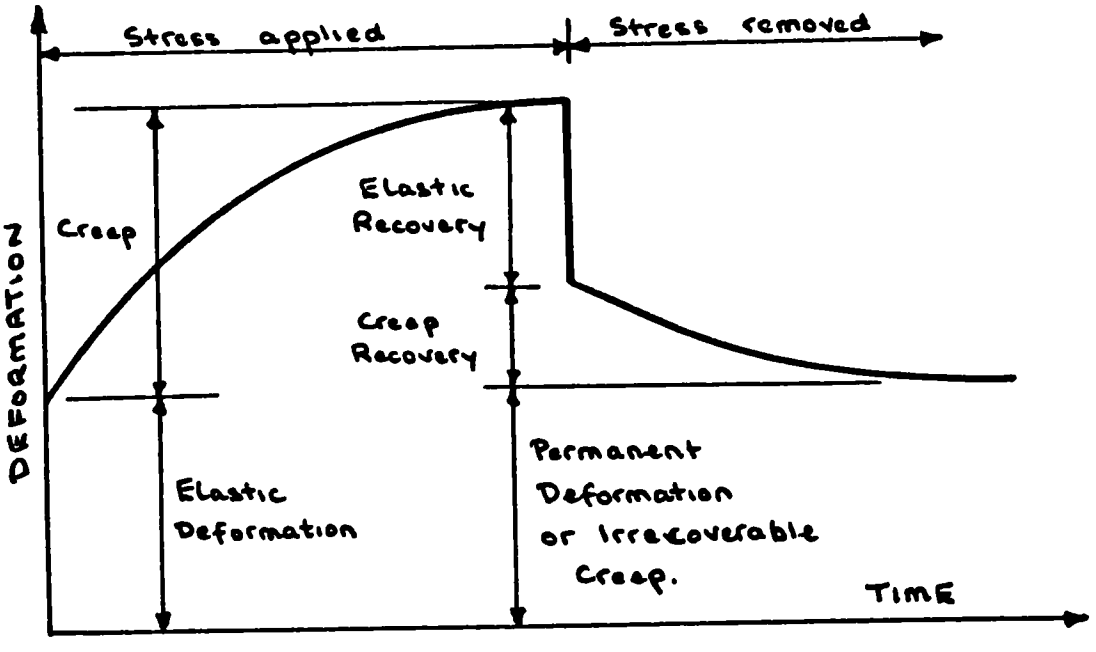

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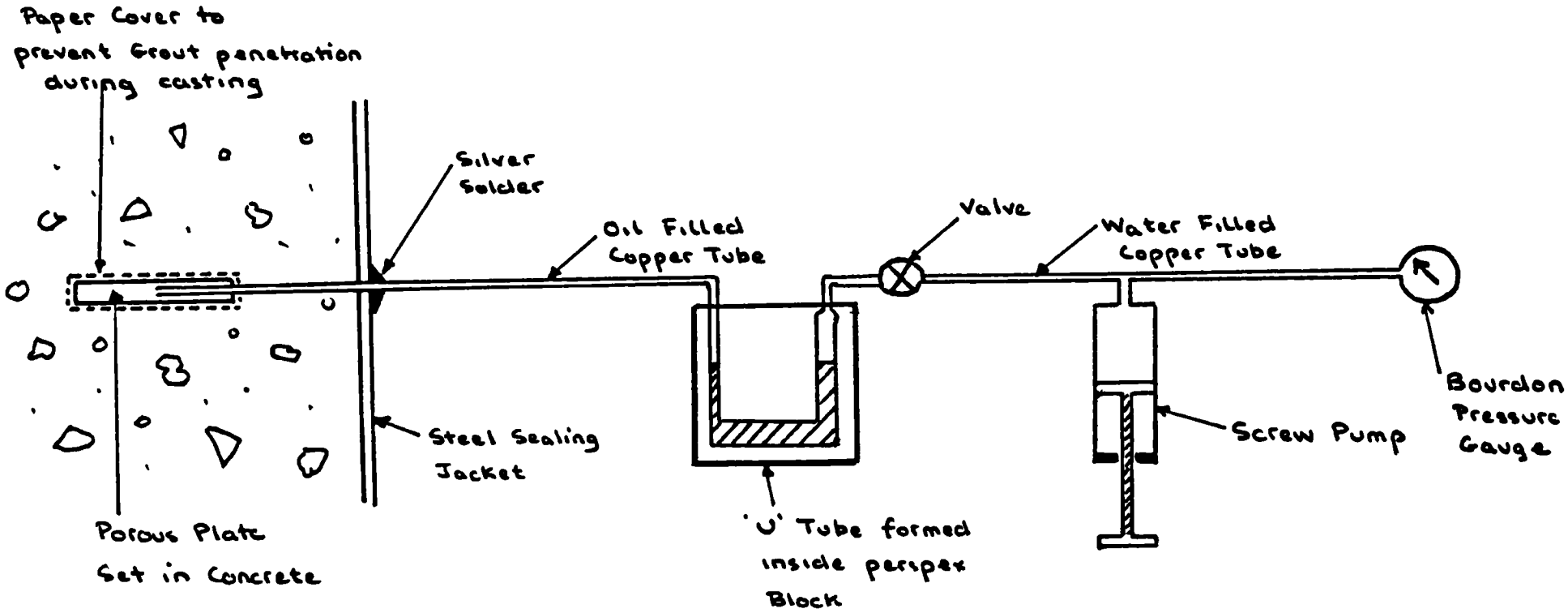

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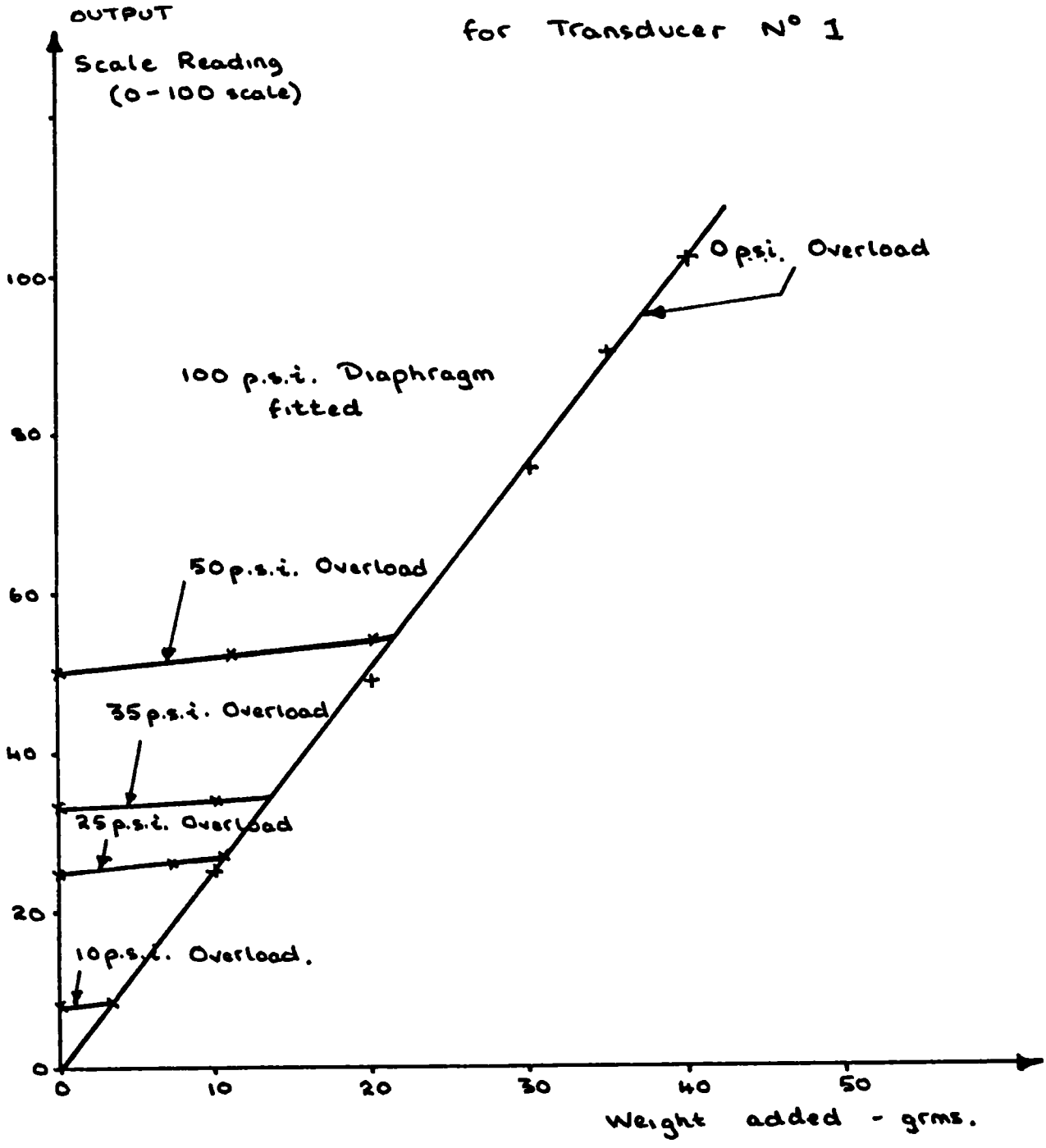
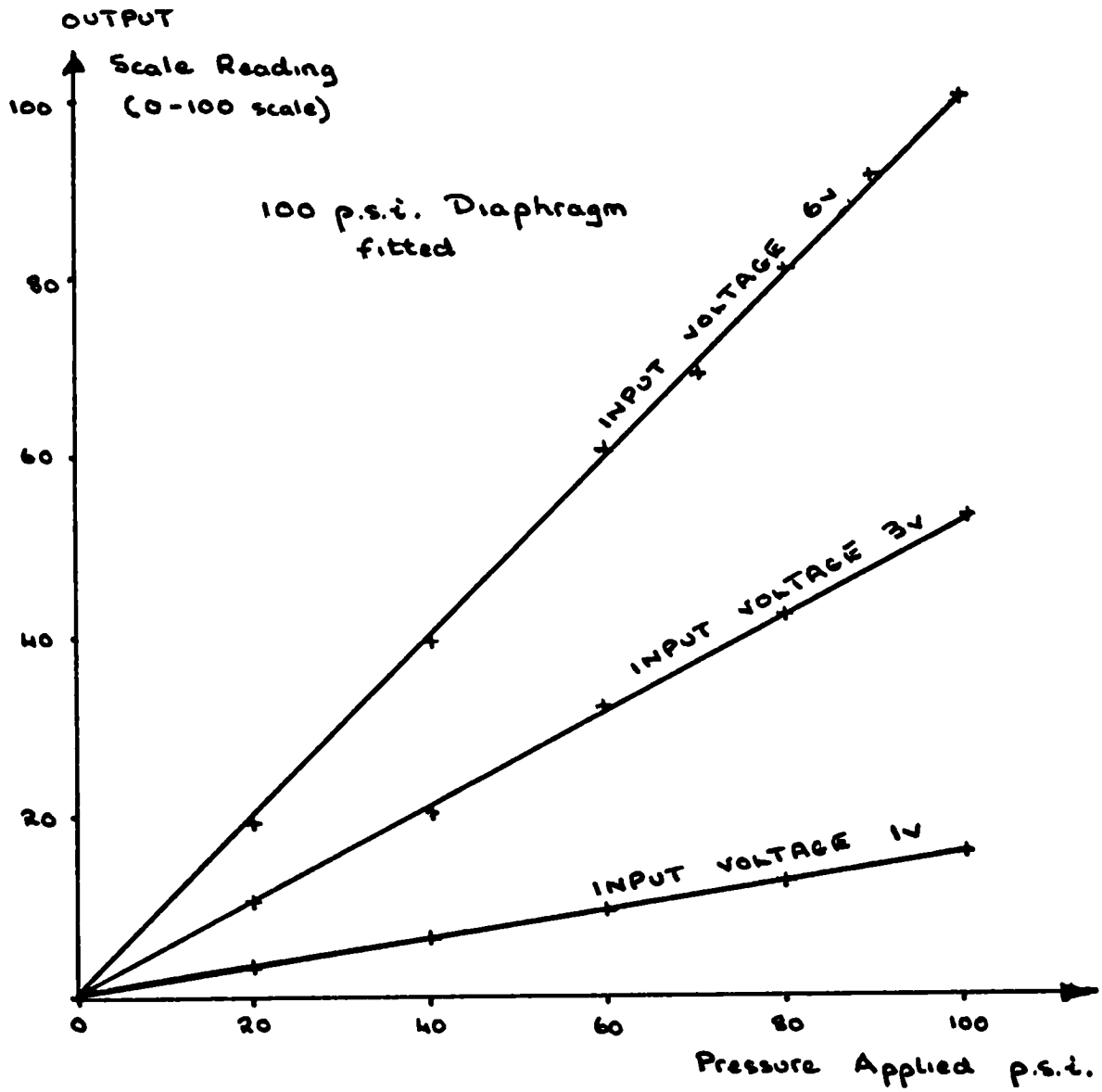
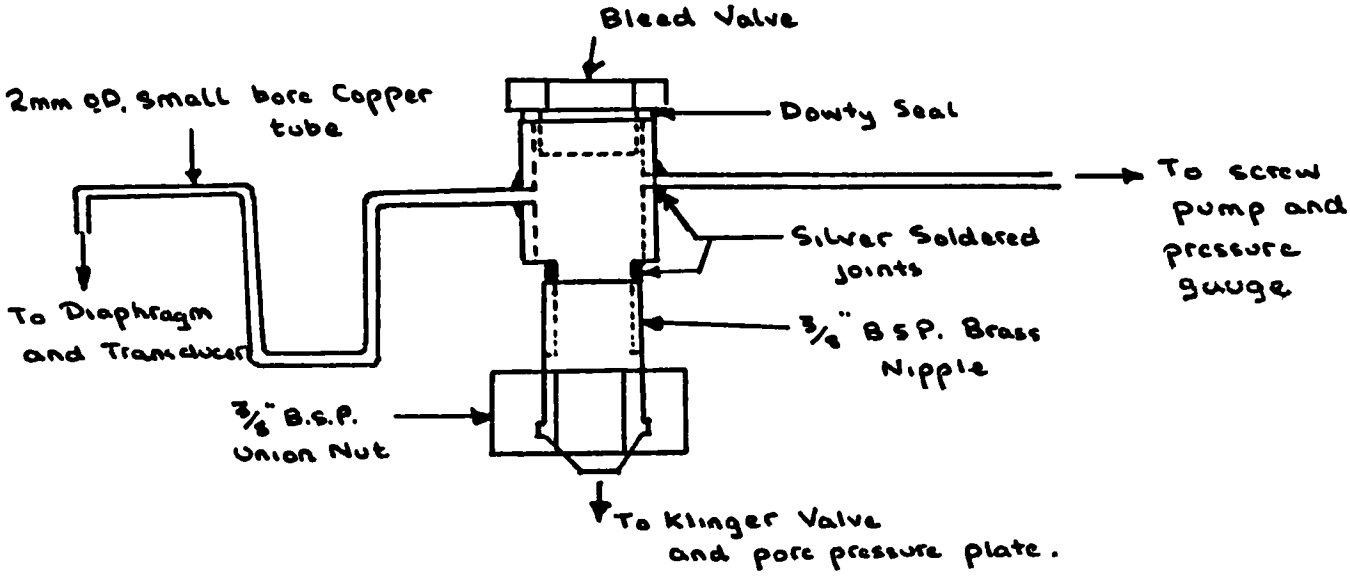


Fig 3:3- Graph of Scale Reading against Pressure applied at various input voltages for Transducer N° 1.





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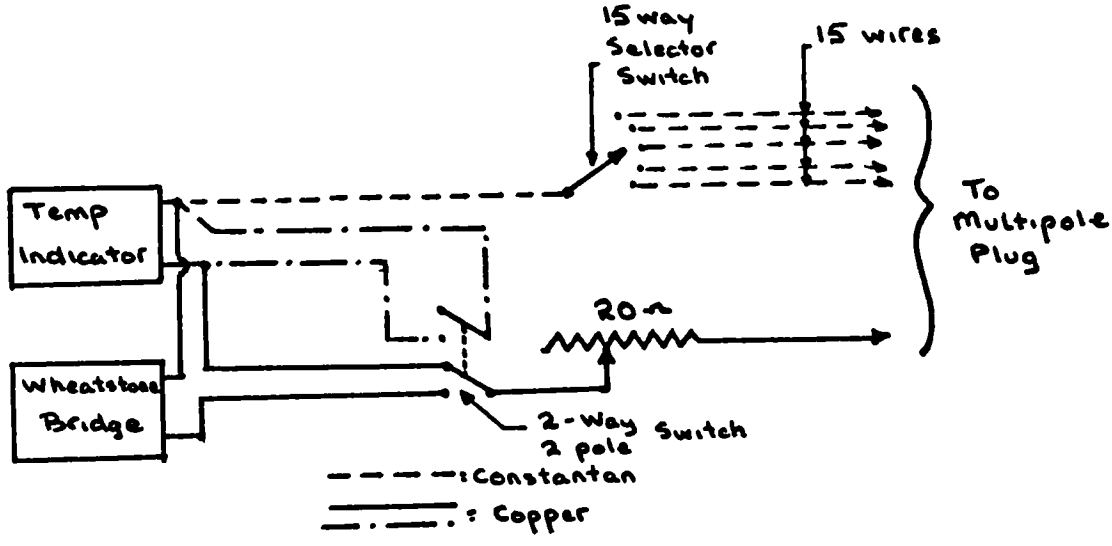

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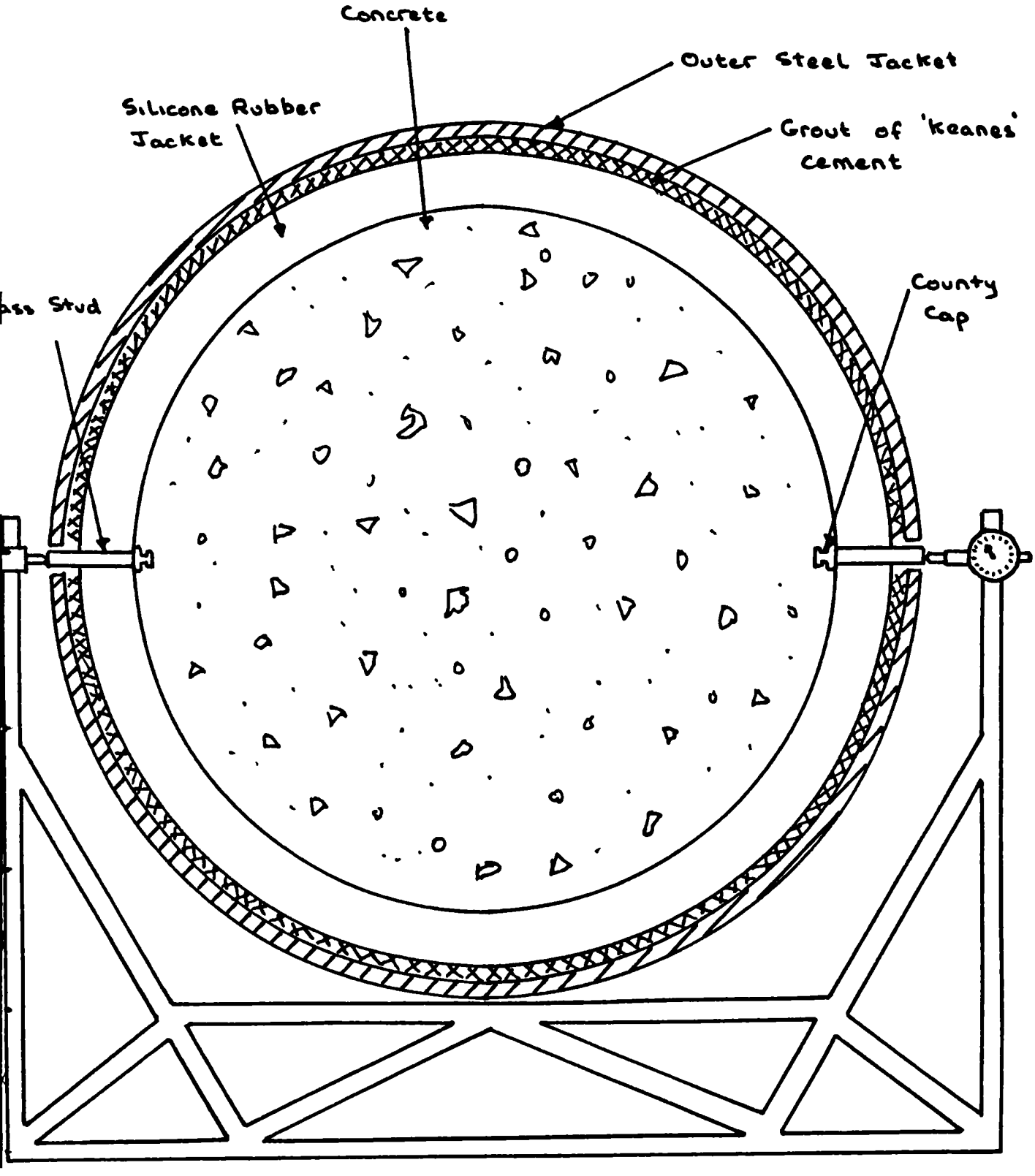


Fig 3:6 - Diagrammatic representation of the measurement of horizontal shrinkage strain.

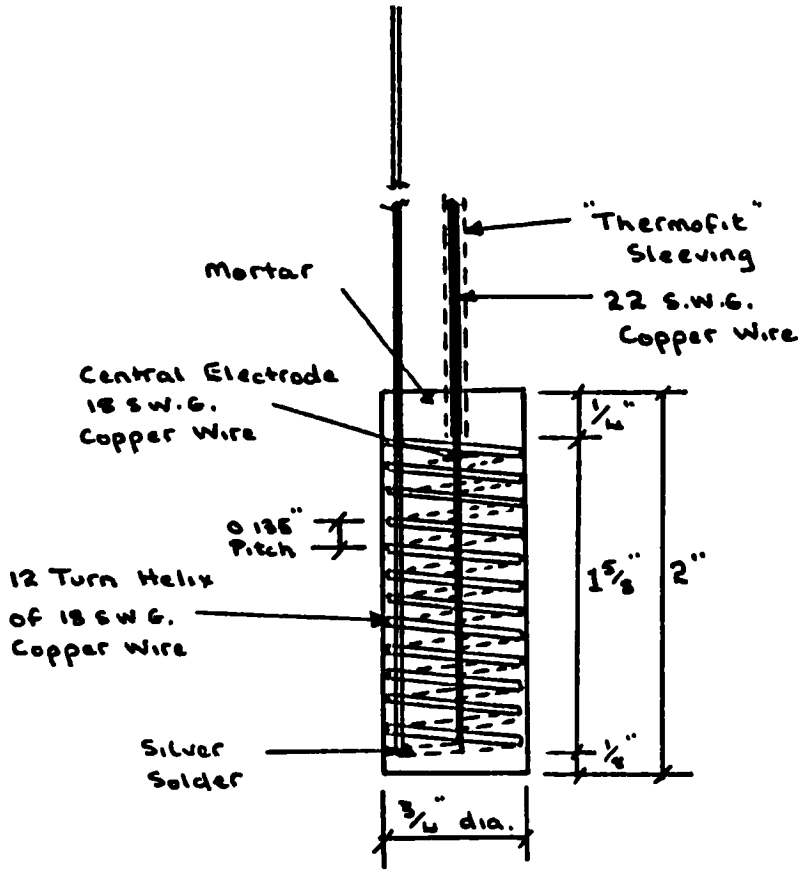
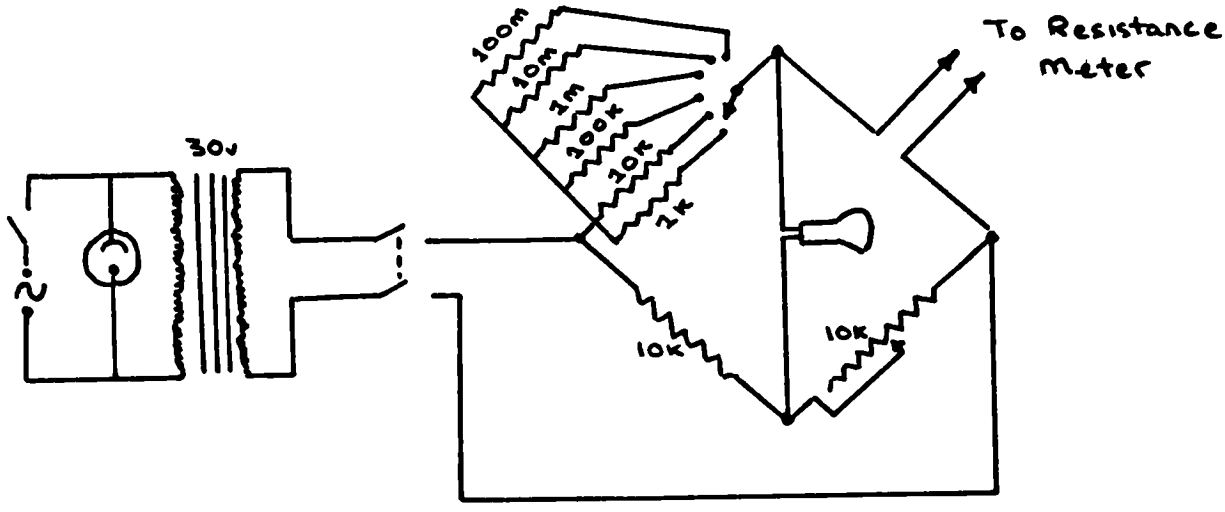


Fig 3:7- Details of a typical Resistance Moisture Meter.



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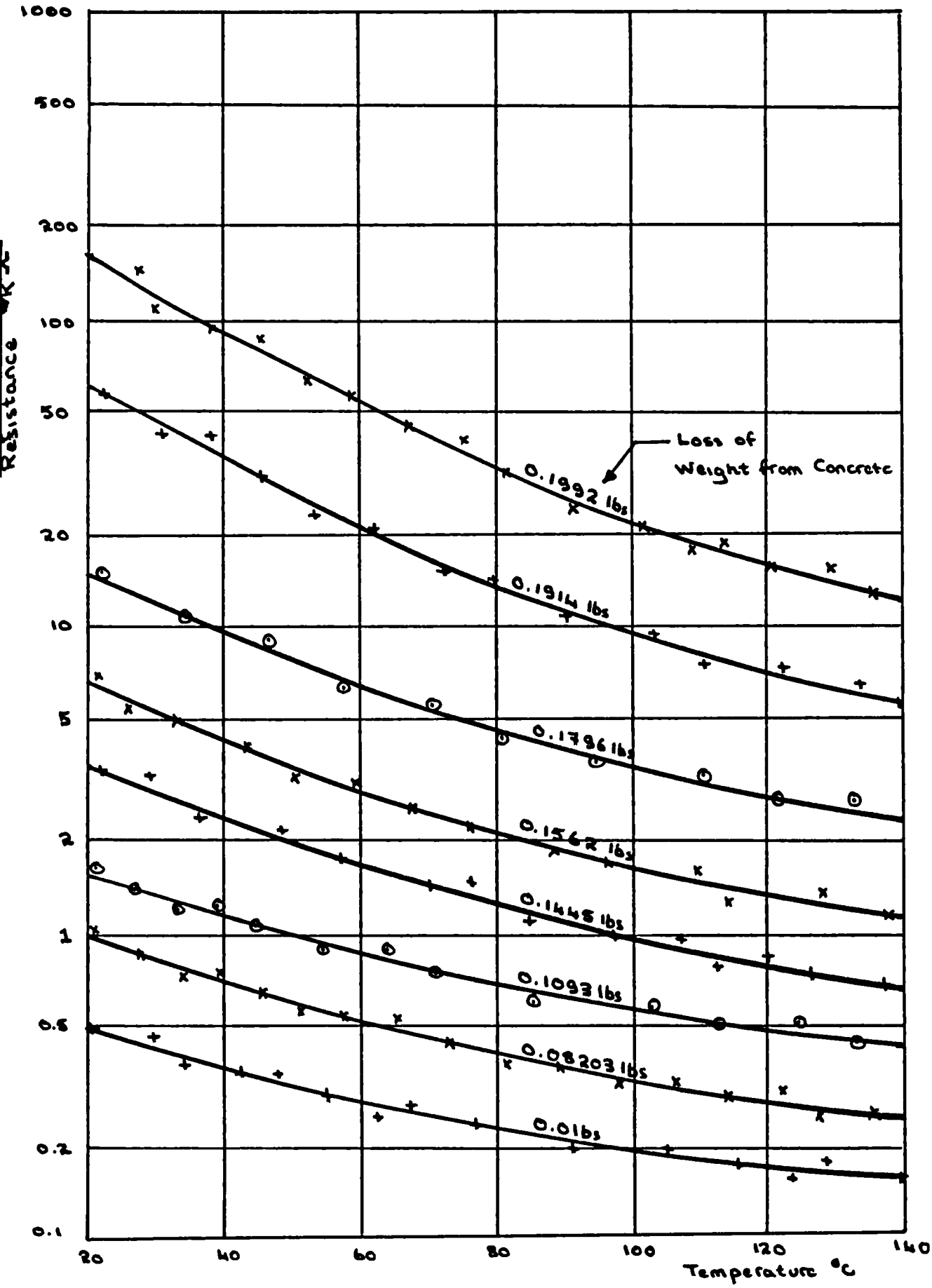

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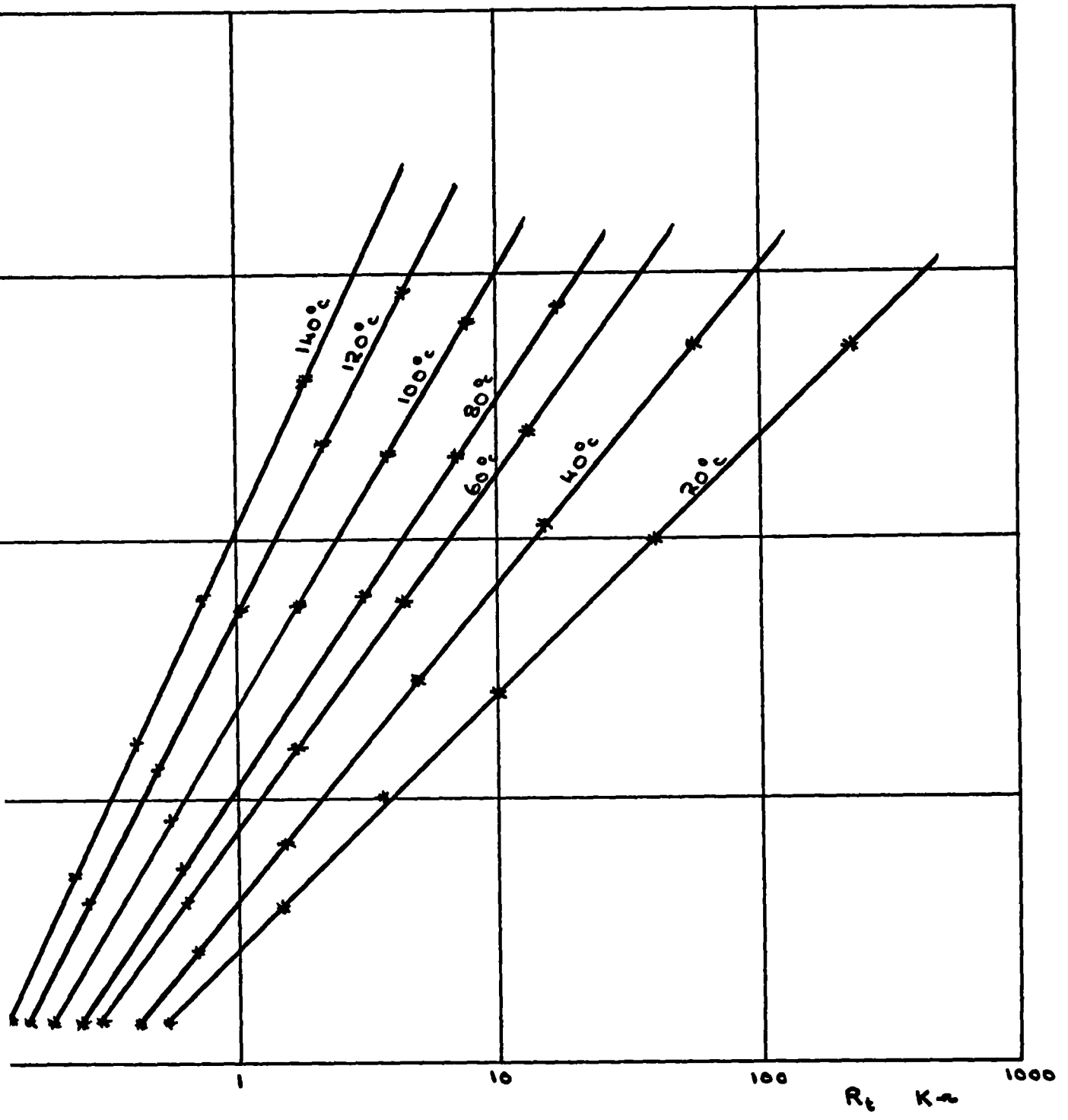

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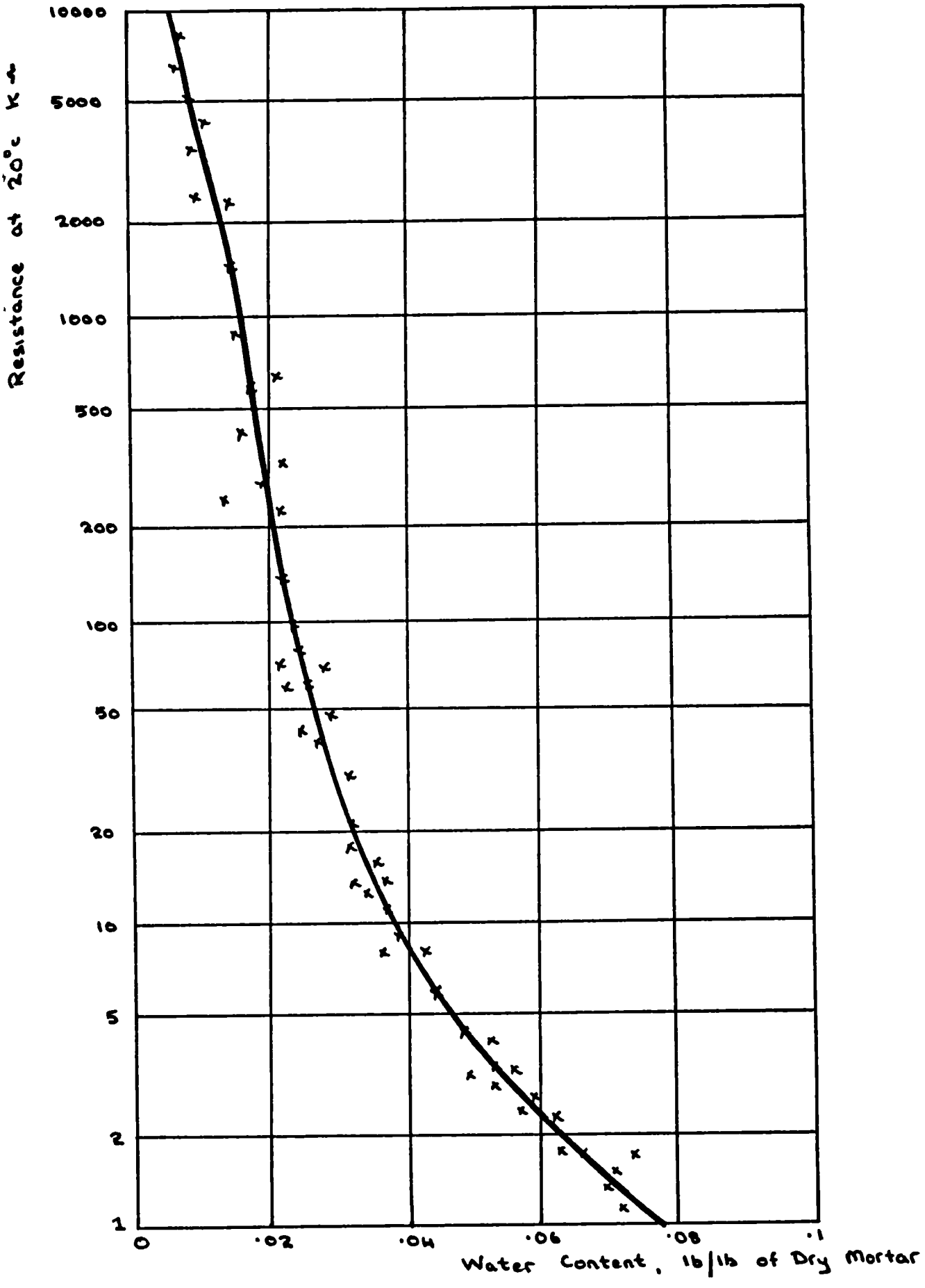

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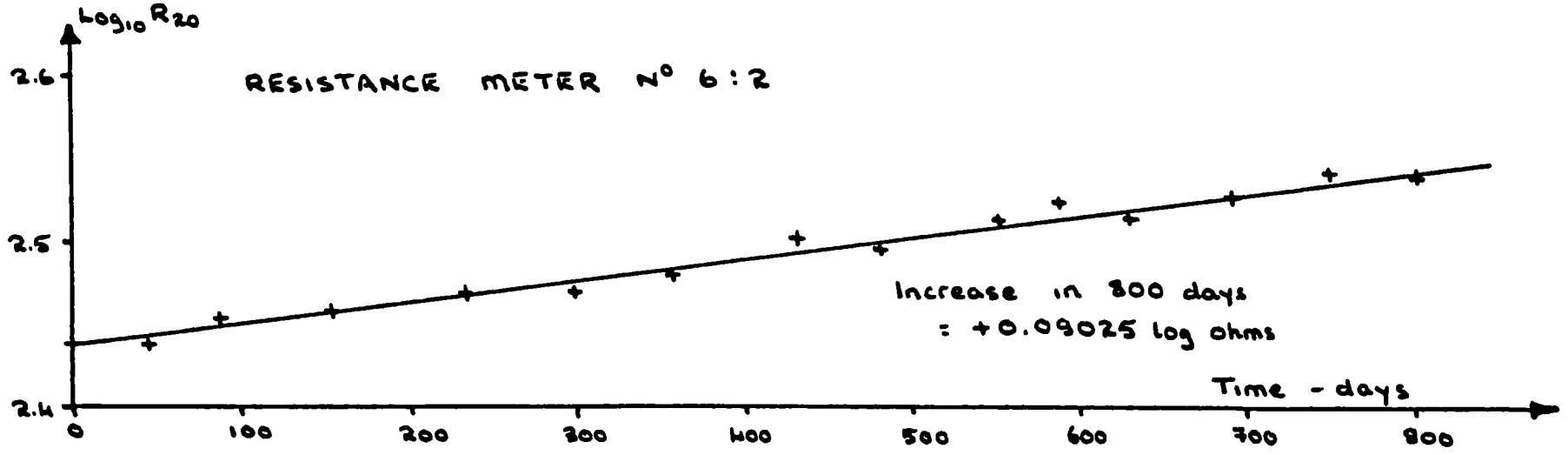
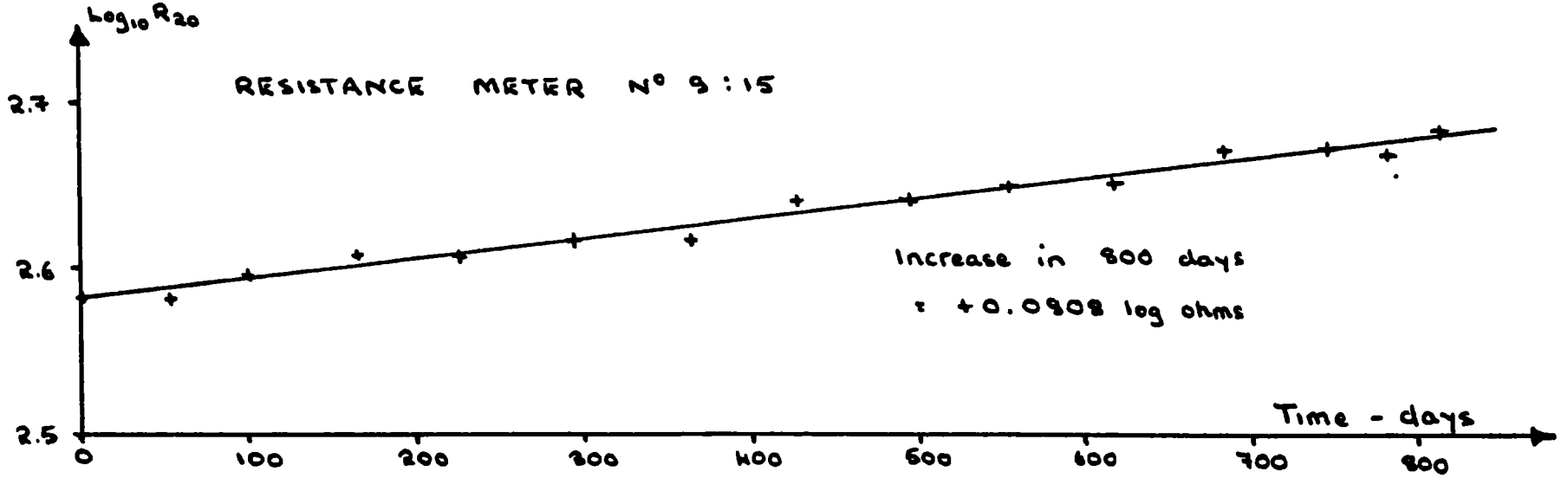


Fig 3:12- Variation of R_{20} with time for a Resistance Meter Kept in Sealed Specimen (Meter N° 6:2)



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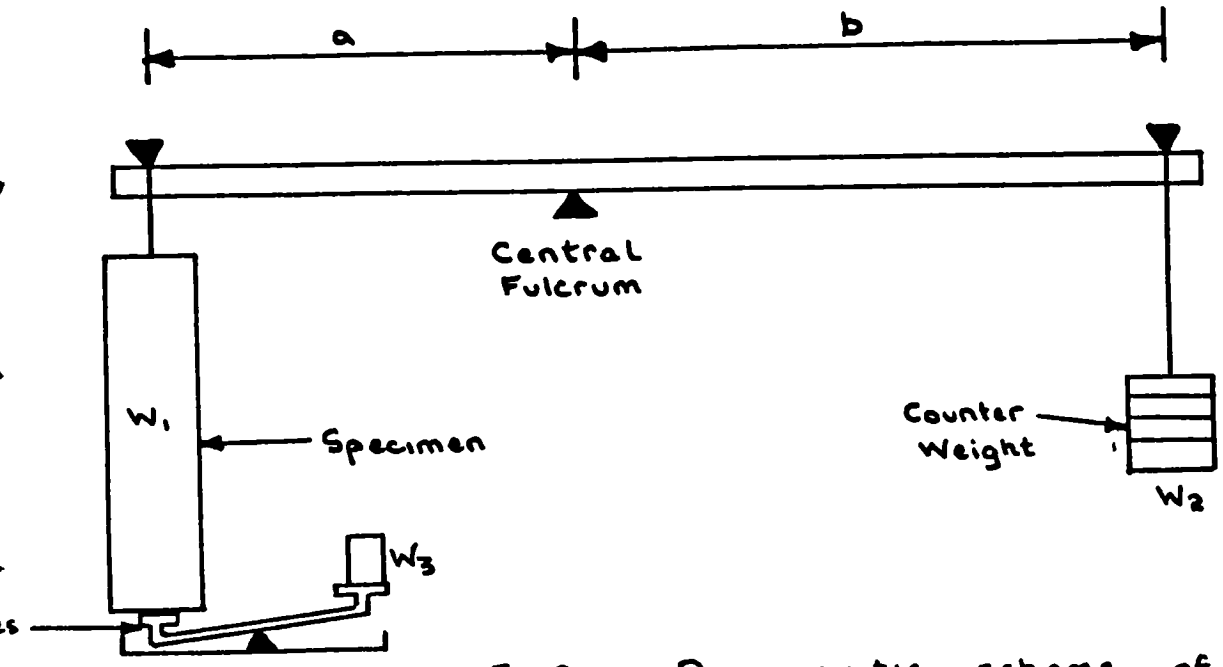

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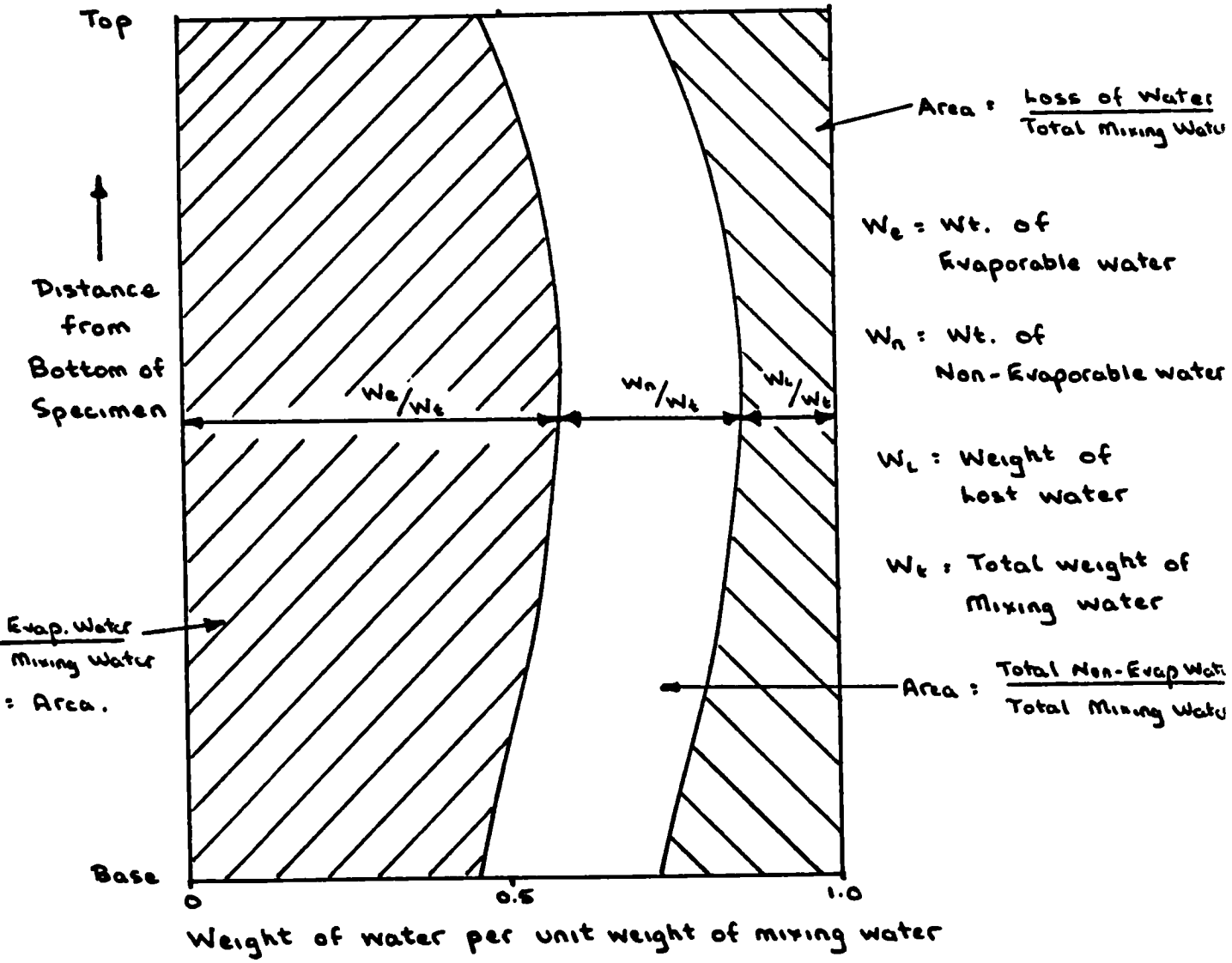


Fig 3:15- Diagrammatic Representation of a Graph showing Final Water Distribution along a Migration Specimen

PLATE III : 1.

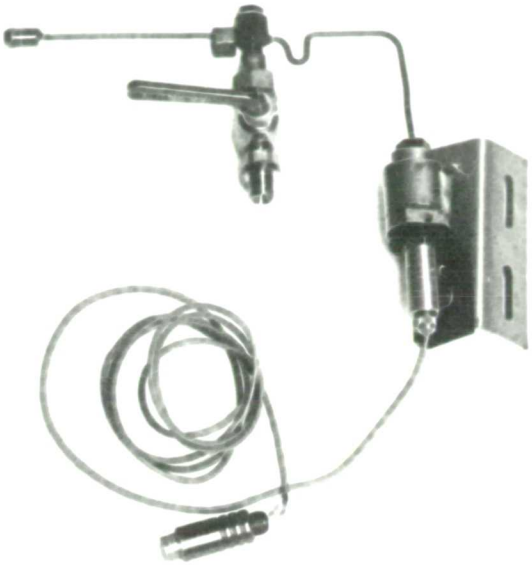
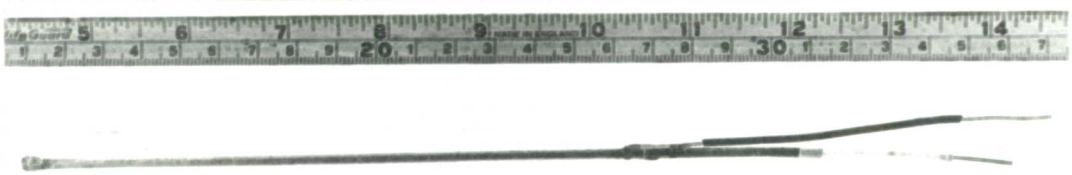


PLATE III : 2.



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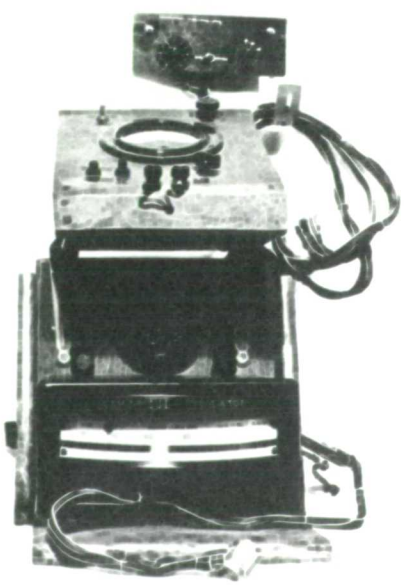
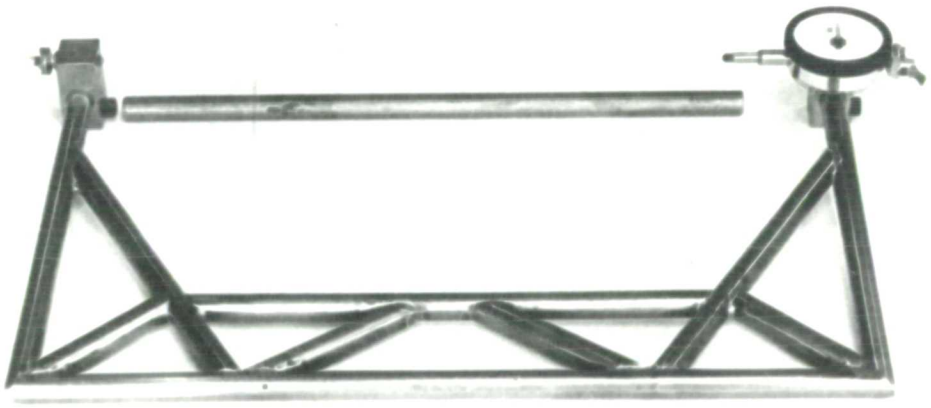


PLATE III : 4.

PLATE III : 5.



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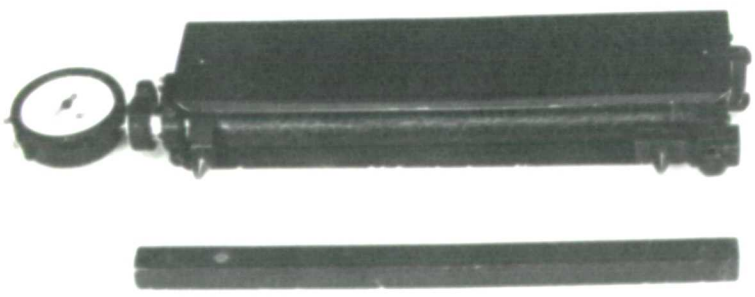

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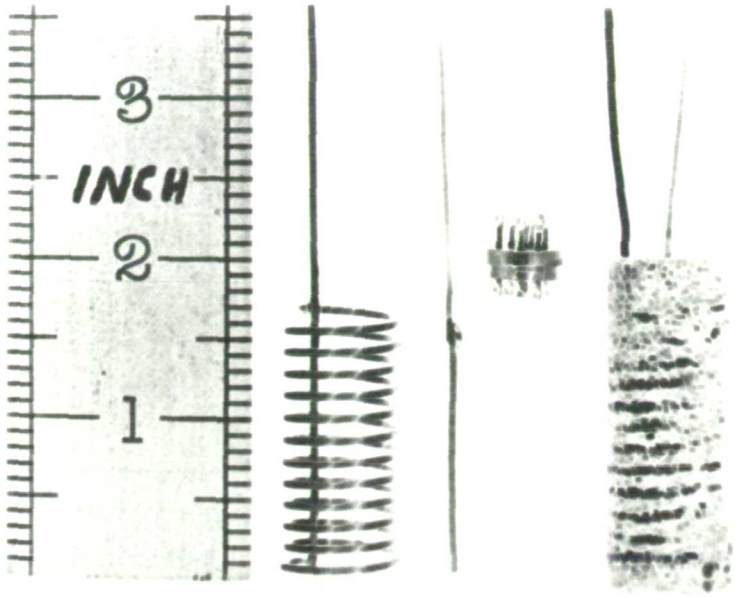

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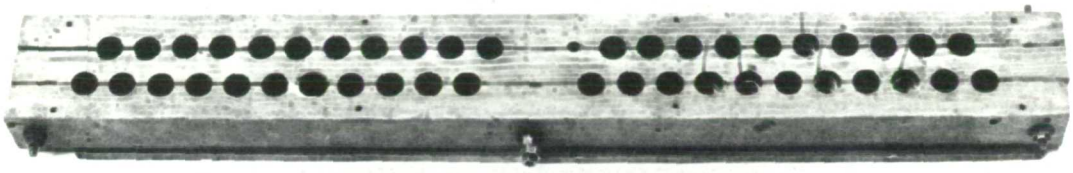

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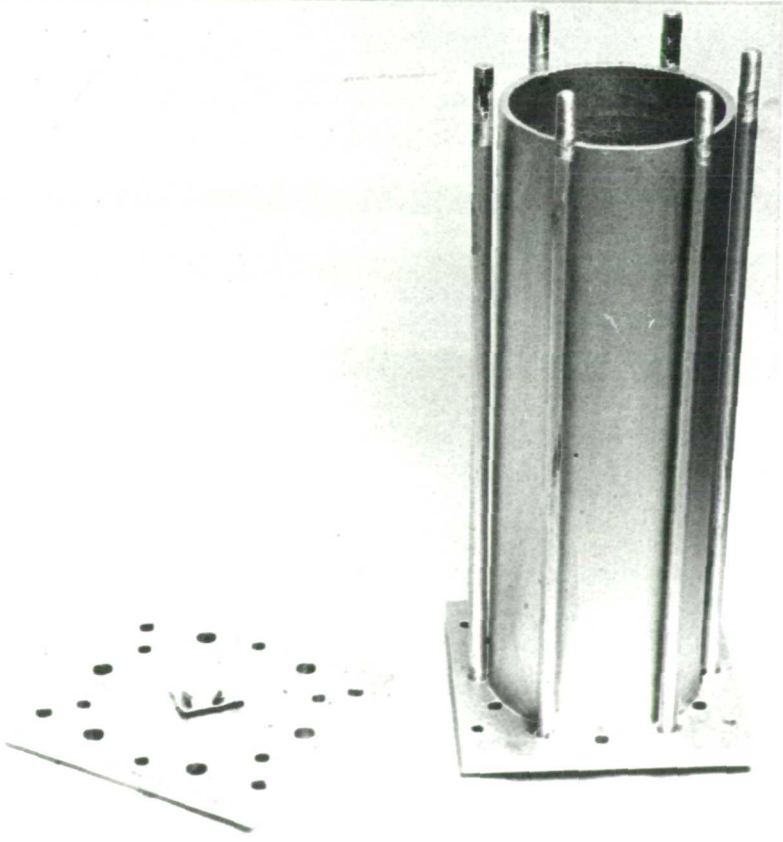

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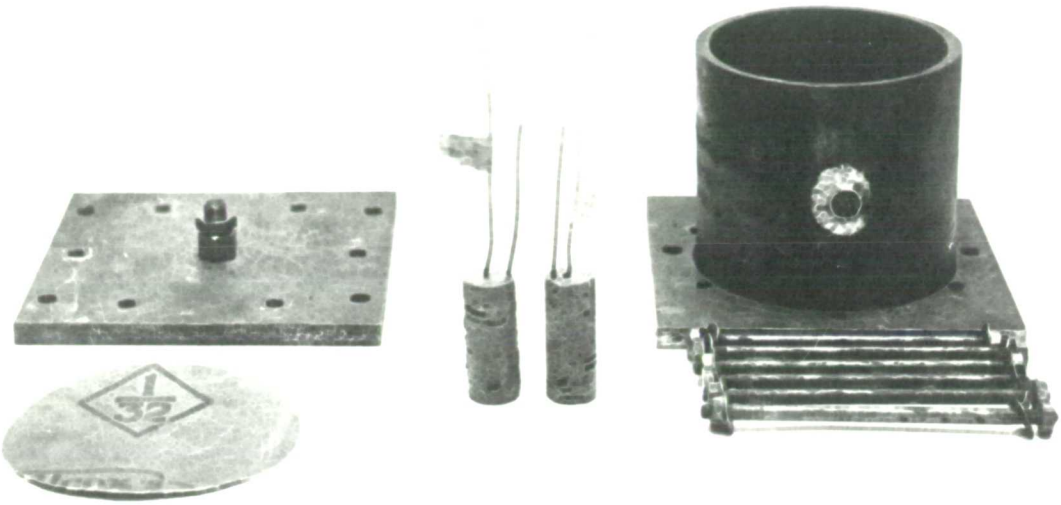

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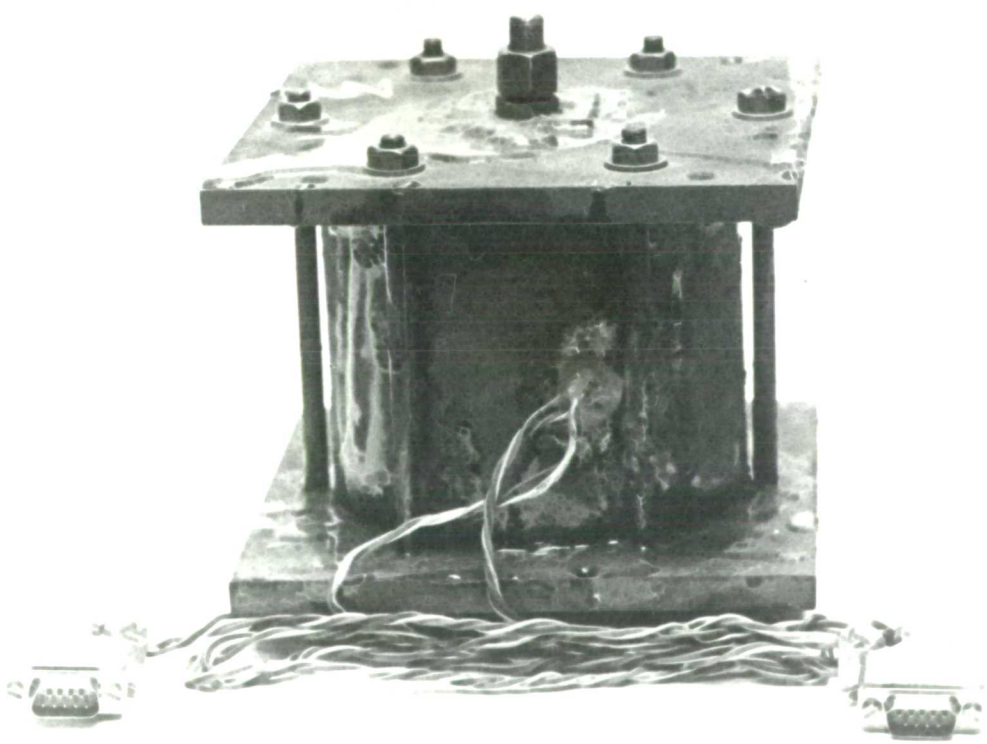

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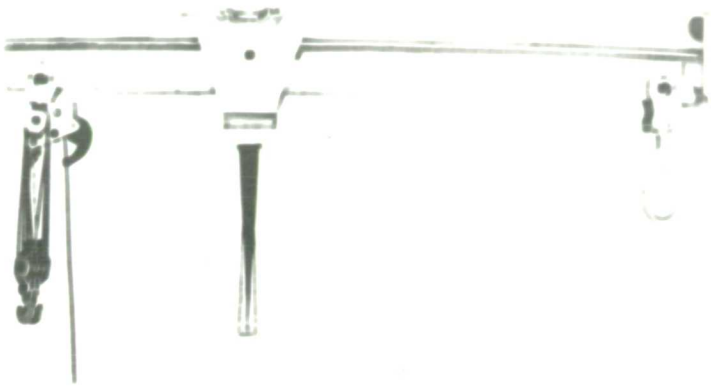

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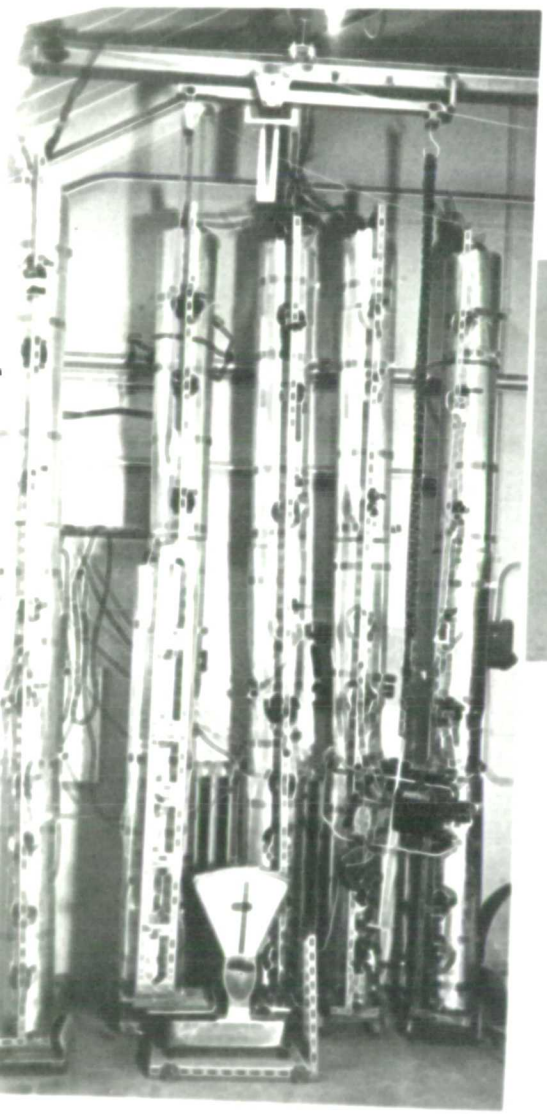

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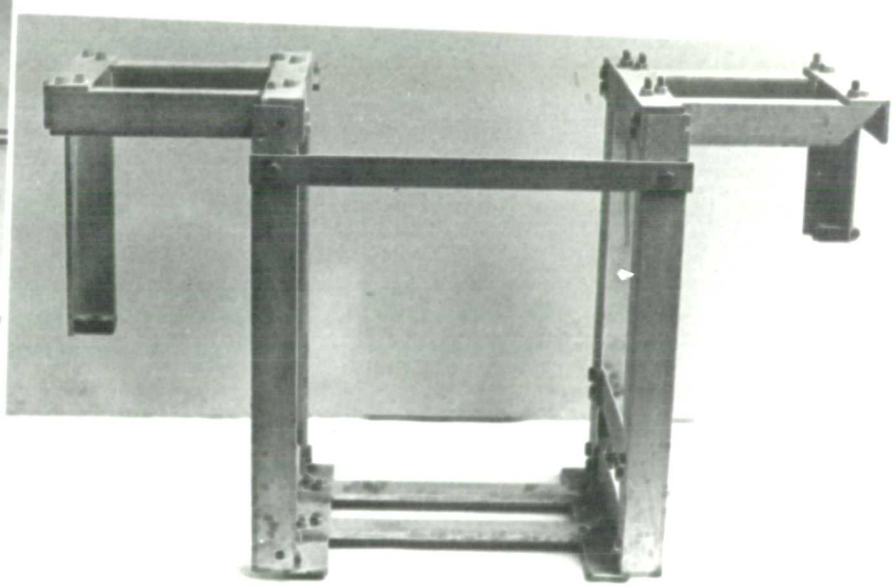

PLATE III : 15.

CHAPTER FOUR - FIGURES AND PHOTOGRAPHS.

FIGURES FOR CHAPTER FOUR.

Figure 4·1 - Grading Curves for the Limestone Aggregate and Standard Grading Curves.

Figure 4 2 - Section through Release Test specimen.

Figure 4·3 - Location of 1½" diameter holes in migration and venting test series specimens.

Figure 4·4 - Section through a typical socket after welding to steel jacket.

Figure 4·5 - Section A-A showing Base Heater Design and attachment to migration specimens in Plan.

Figure 4 6 - Section B-B showing Base Heater Design and attachment to migration specimens in elevation.

Figure 4·7 - Details of half mould of cast iron used to cast pore pressure/shrinkage specimen.

Figure 4:8 - Section A-A showing in elevation details of steel jacket anchored to base plate.

Figure 4:9 - Section B-B showing plan of details of steel jacket anchored to Base Plate.

Figure 4·10 - Details of positioning of ¼" and ⅛" holes drilled in steel outer jacket to accommodate instrumentation relative to the base.

Figure 4·11 - Diagrammatic representation of Lubricating system used in extracting cores from concrete specimens.

PHOTOGRAPHS FOR CHAPTER FOUR.

Plate IV:1 - View of Sealing Jacket prior to Casting.

Plate IV:2 - View of Specimens ready for casting on vibrating table.

Plate IV:3 - View of Specimen ready for testing.

Plate IV:4 - View of specimen assembled in oven ready for testing.

Plate IV:5 - View of specimen being weighed during a Release Test.

Plate IV:6 - 5 ft. specimen under test for welds.

Plate IV:7 - 10 ft. specimen under test for welds.

Plate IV·8 - View of Poter vibrator being used in 5 ft. specimen during casting.

Plate IV.9 - View of 10 ft. specimen in casting order.

Plate IV,10 - View of instrumentation introduced into specimen during casting.

Plate IV:11 - View of gas plug with instrumentation passing through and coat of autoplax resin.

Plate IV:12 - View of steel hook and bar inserted in specimen.

Plate IV.13 - View of klinger valve + lagging on socket.

Plate IV·14 - View of Base Heater.

Plate IV:15 - View of tape heater on 5 ft. specimen.

Plate IV:16 - View of Heater Control Panel.

Plate IV·17 - View of 1- ft. specimen showing spacing of tape heaters and also specimen ready for testing.

Plate IV·18 - View of bank of 5 ft. specimens ready for testing.

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Plate IV:20 - Specimen length cut using Pipe cutter.

Plate IV:21 - View of individual Pore Pressure/ Shrinkage mould with instrumentation.

Plate IV·22 - View of specimen mould ready for casting.

Plate IV:23 - View of specimen cast in test casting procedure.

Plate IV:24 - Mould used in cast Silicone Rubber jacket.

Plate IV:25 - View of Silicone Rubber jacket "half cast".

Plate IV:26 - View of Steel outer jacket by itself.

Plate IV:27 - View of Klinger valves fixed to handy angle as used in pore pressure/ shrinkage experiment.

Plate IV·28 - View of Pore Pressure/Shrinkage specimen ready for testing and heater control panel.

Plate IV:29 - View of Vertical movements being recorded.

Plate IV:30 - View of Horizontal movements being recorded.

Plate IV:31 - Subsidiary specimen to assess behaviour of sealing jacket on Pore Pressure/ Shrinkage test.

Plate IV:32 - View of specimen used to assess variation of co-efficient of expansion with moisture content.

Plate IV.33 - View of Coring Drill

Plate IV.34 - View of core and brass stub to hold specimen in microscope.

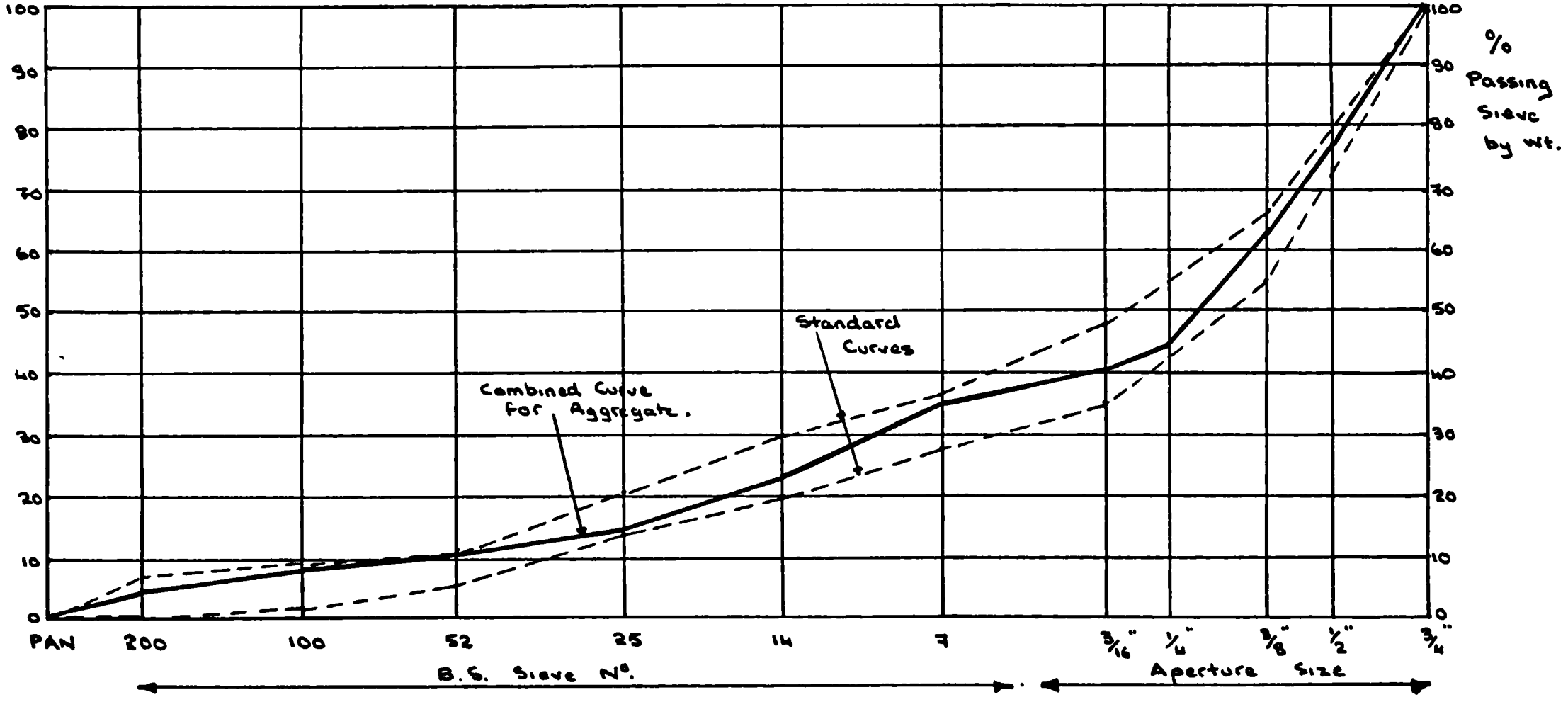


Fig 4:1 - GRADING CURVE FOR LIMESTONE AGGREGATE

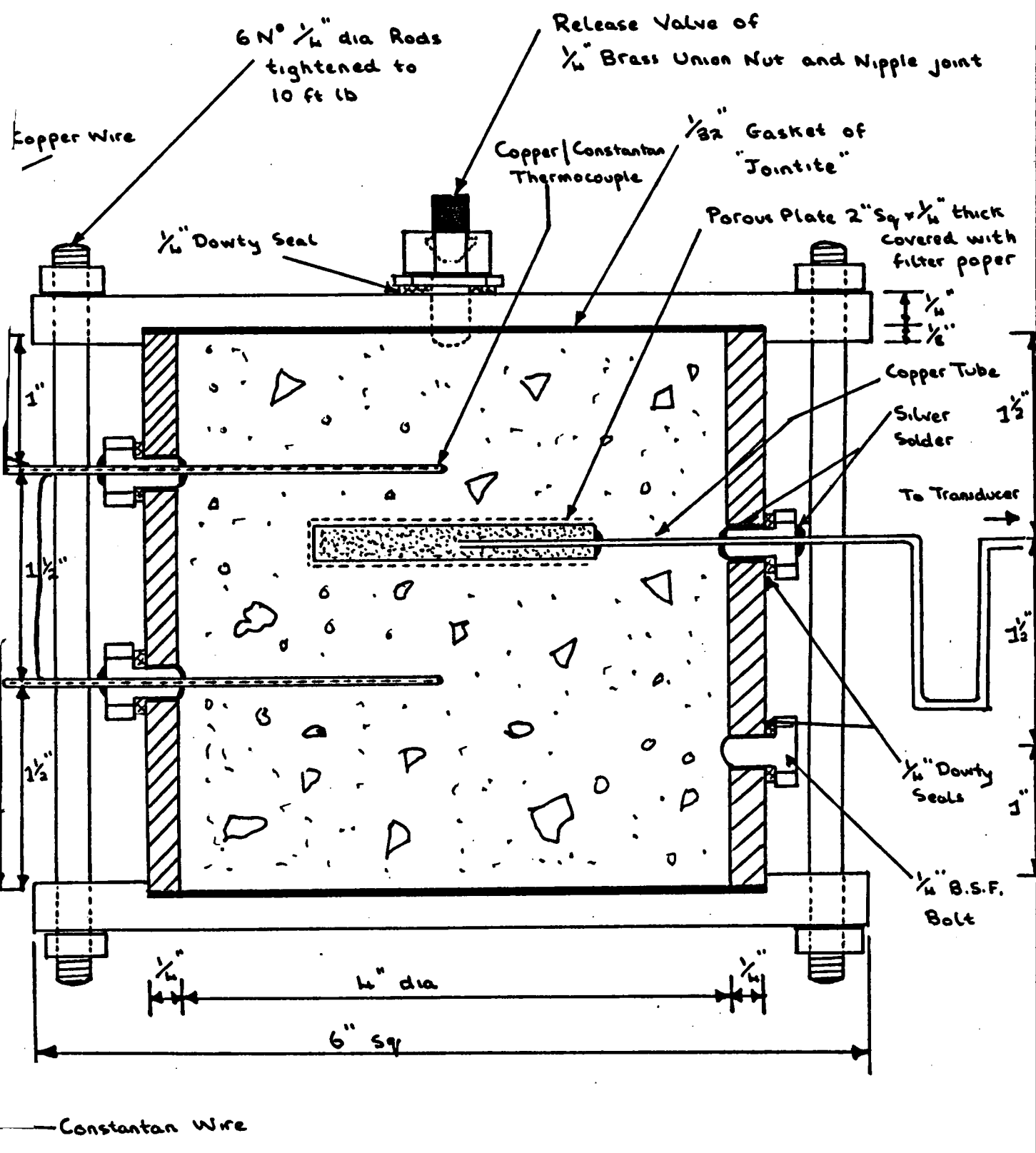
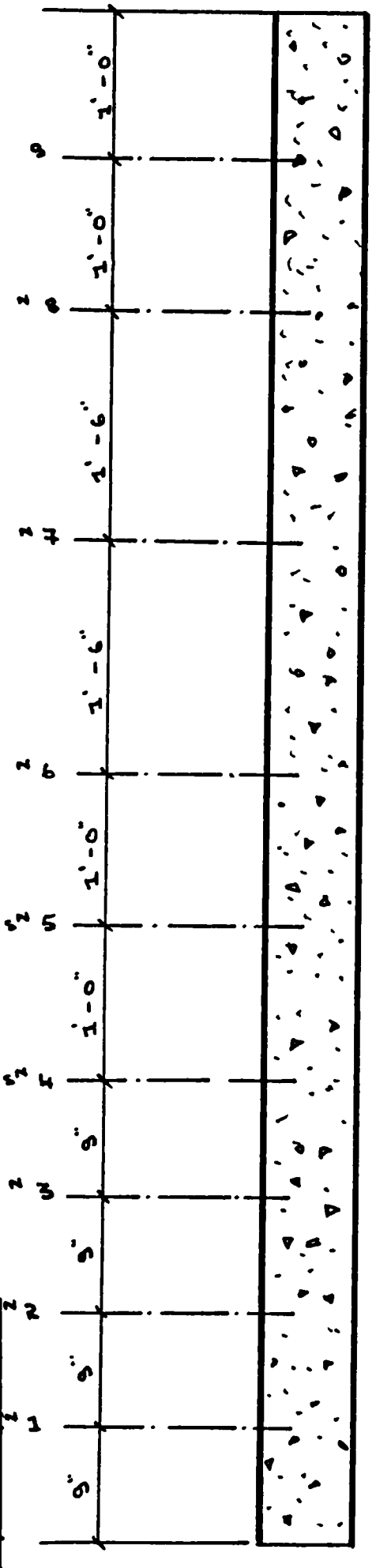


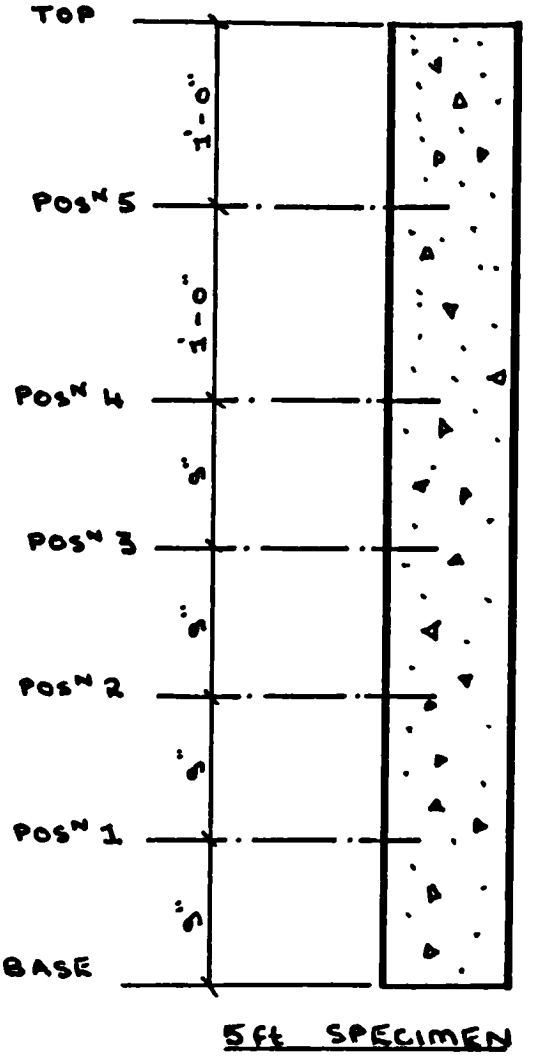
Fig 4:2 - Section through a Release Test Specimen



10ft SPECIMEN

Fig 4:3- Location of 1½" Diameter holes in Migration and Venting Test Series Specimens.

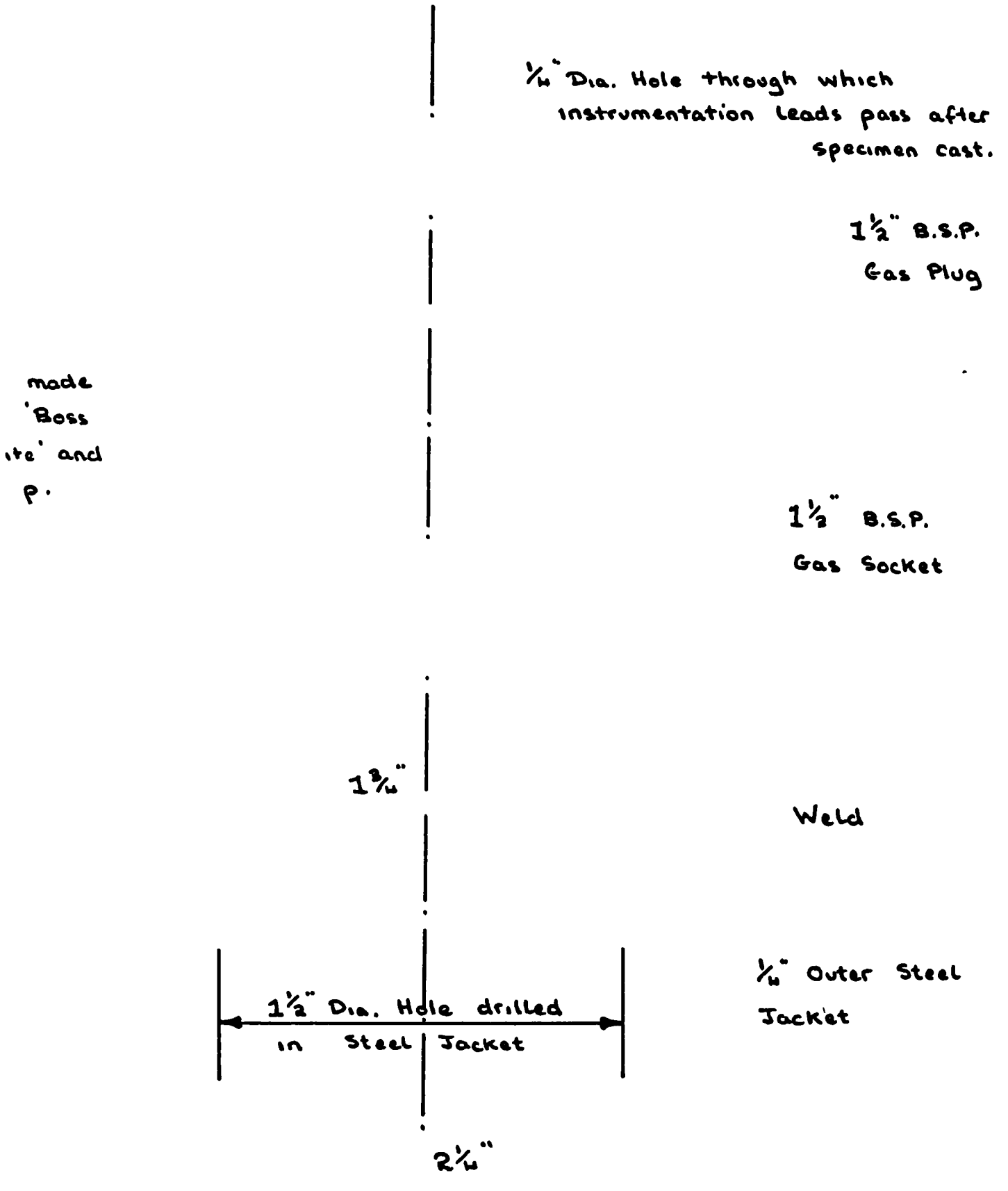
Scale: 1" ≡ 1'



5ft SPECIMEN

Fig. 4:4- Section through a typical plug and socket after welding to the steel jacket.

Scale : Twice actual size



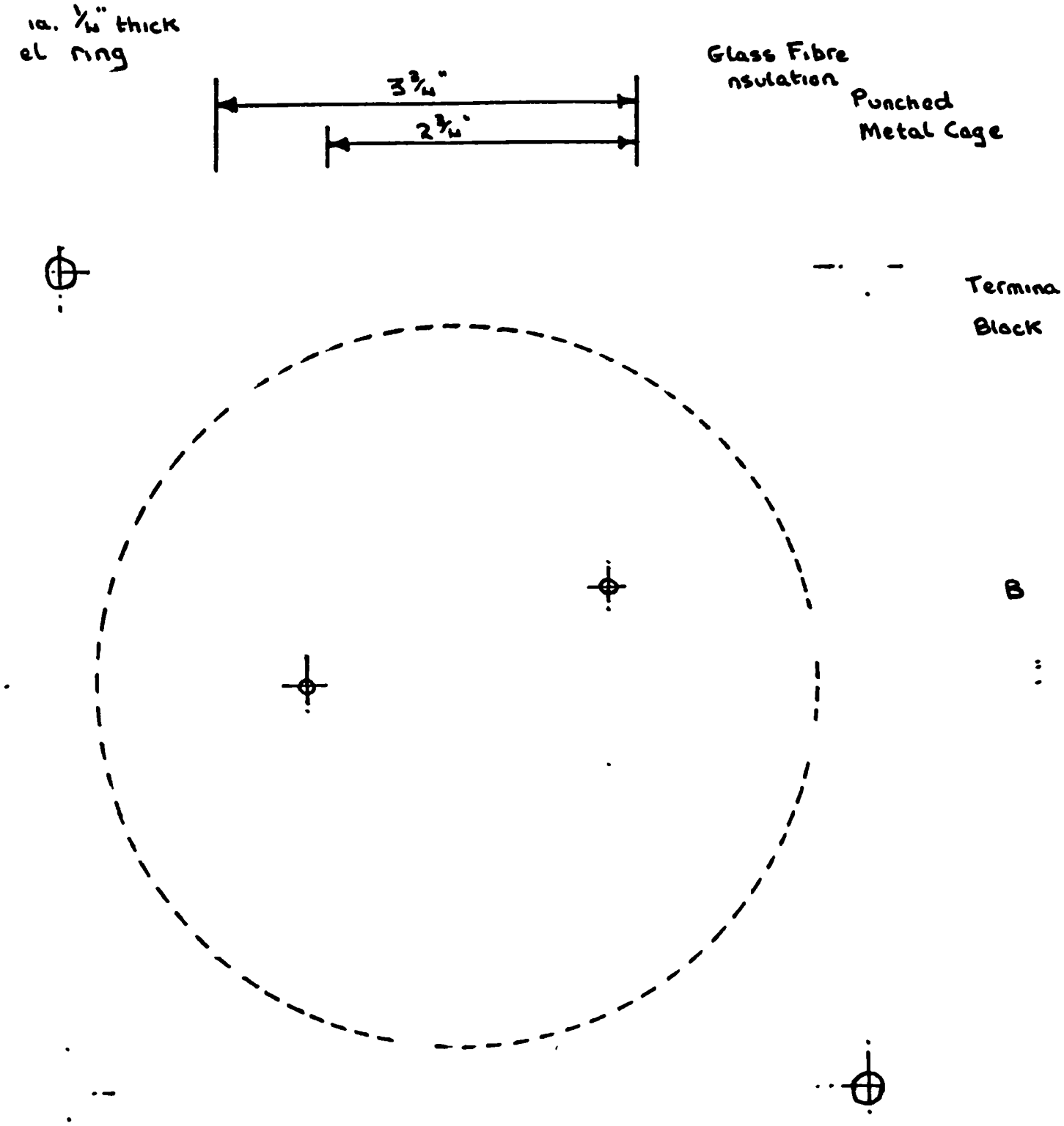


Fig 4:5 - Section A-A showing Base Heater Design and attachment to Migration Specimens. in Plan.

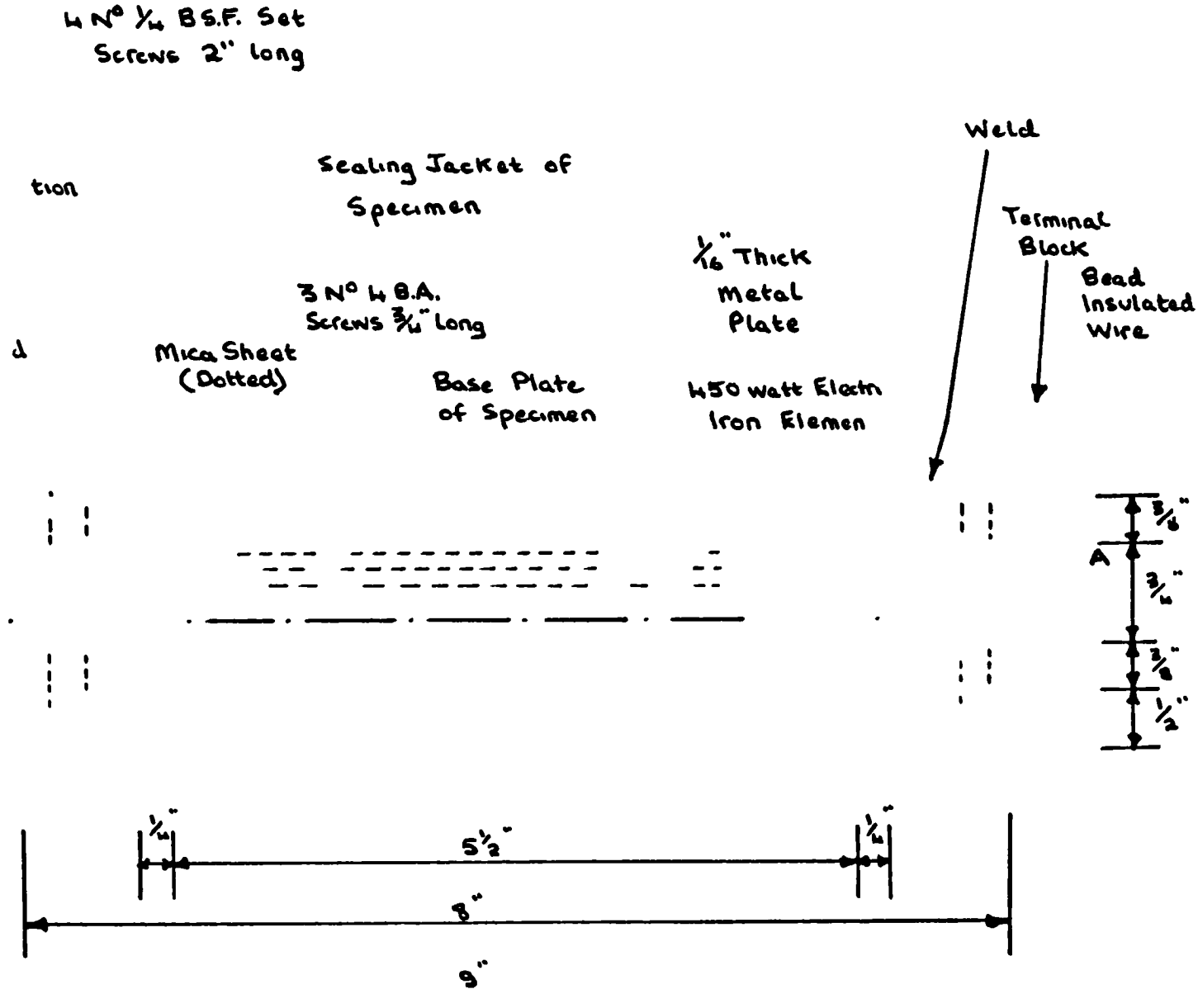
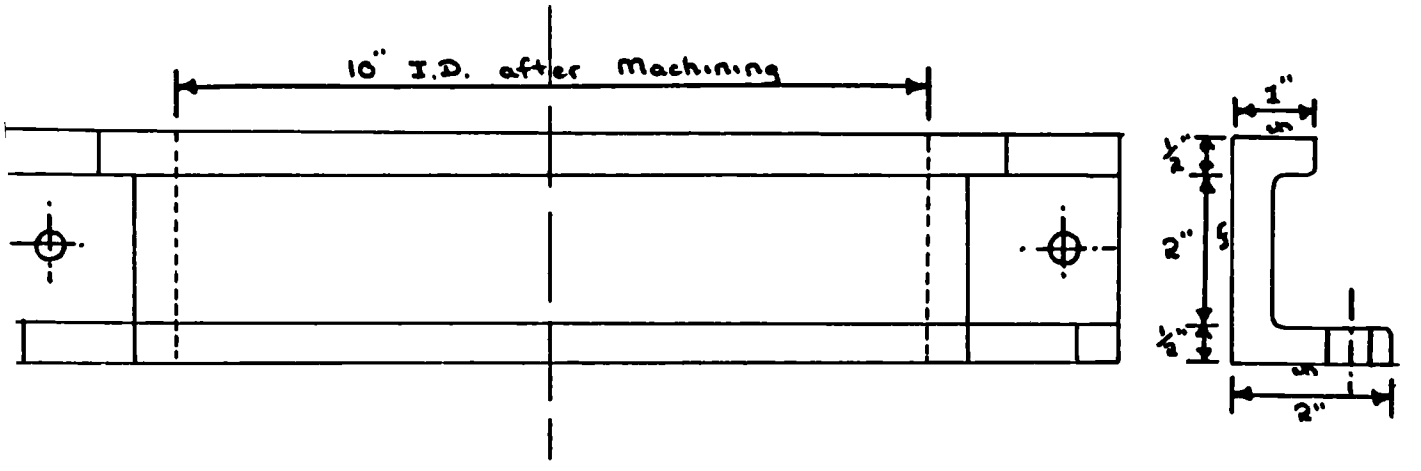
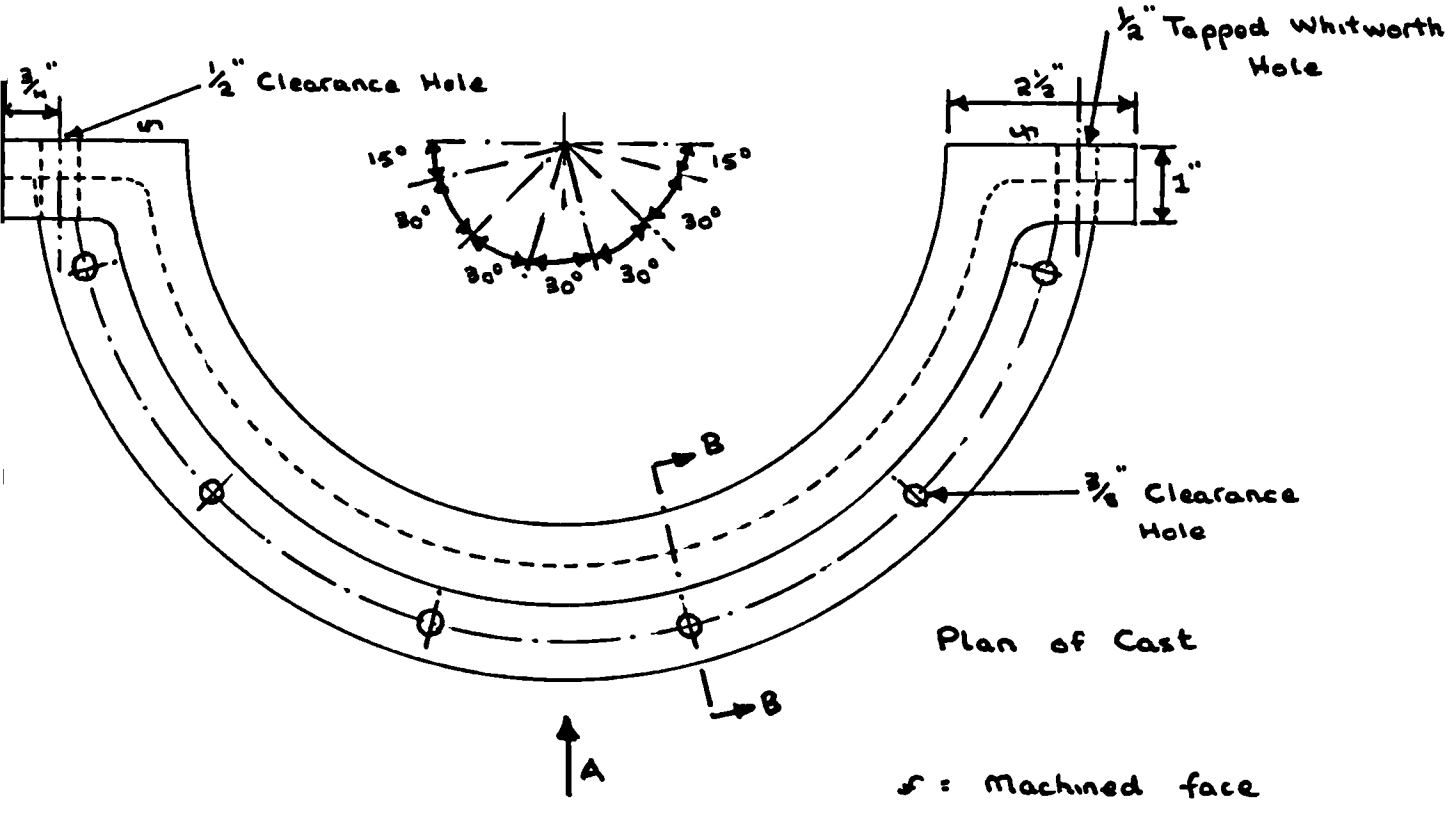


Fig 4:6 - Section B-B showing Base Heater Design and attachment to Migration Specimens. in Elevation



View in direction arrow A

Section B-B



Plan of Cast

f : Machined face

Fig 4:7- Details of half mould of Cast Iron used for casting Pore Pressure - Shrinkage Specimen.

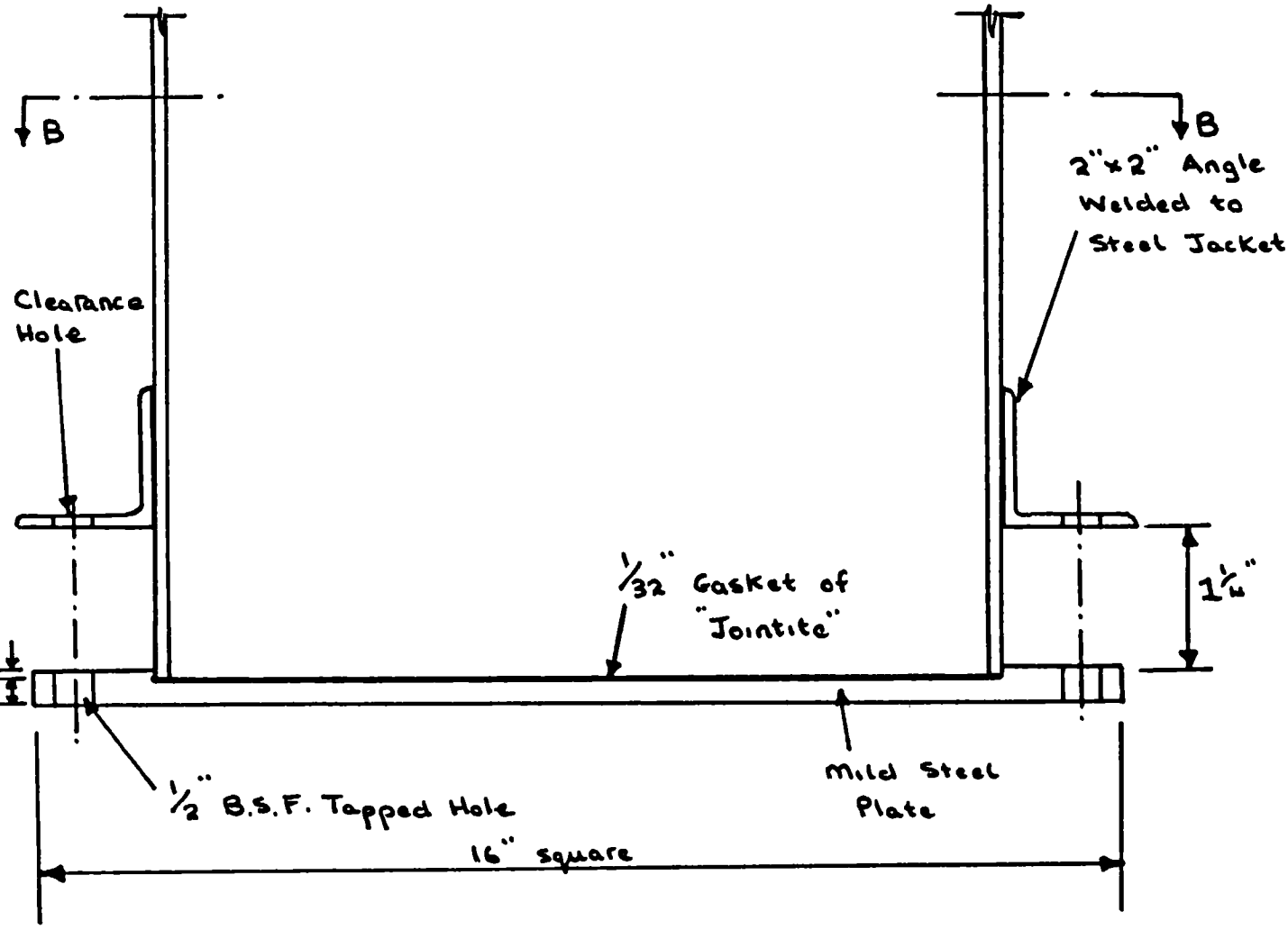


Fig 4:8- Section A-A showing in elevation of details of Steel Jacket anchored to Base Plate.

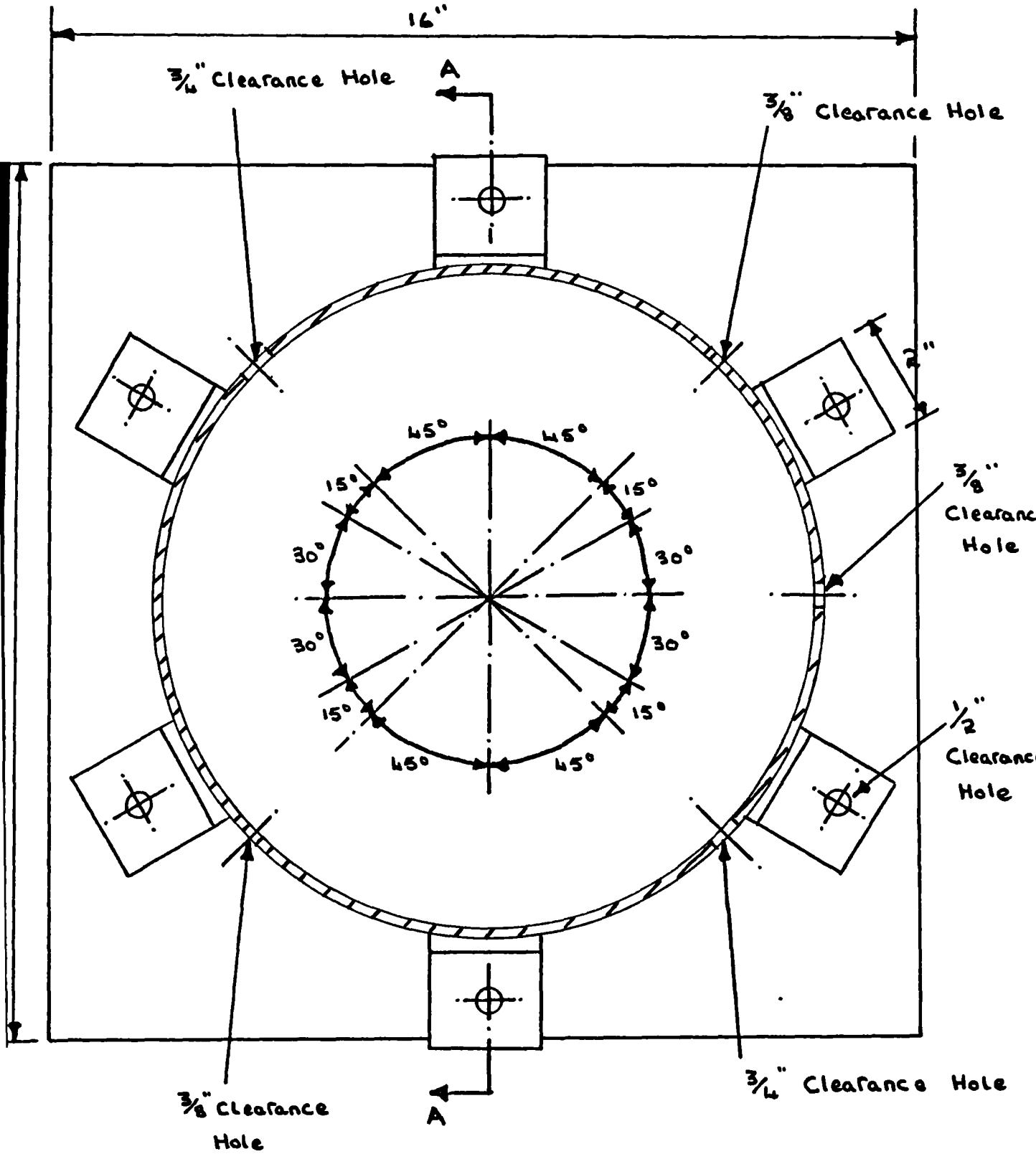
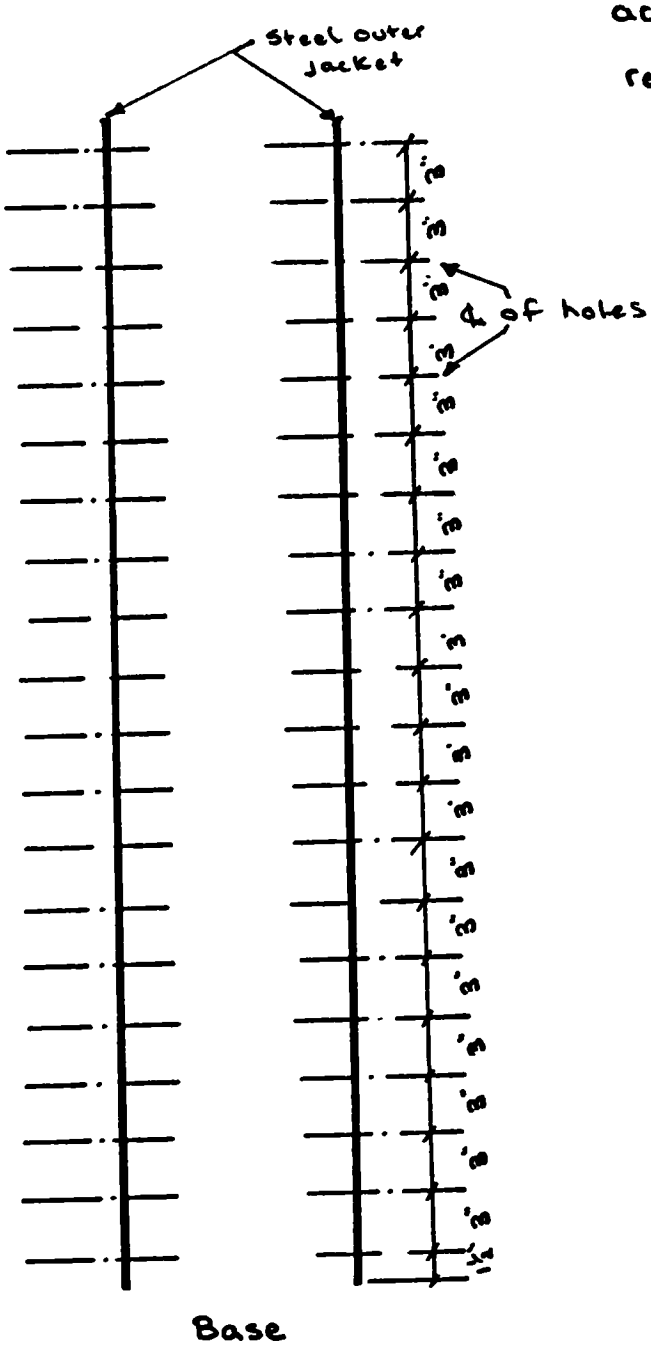


Fig 4:9 - Section B-B showing plan of details of Steel Jacket anchored to Base Plate.

Fig. 4:10. Details of positioning of $^{3}/_{4}$" and $^{3}/_{8}$" holes drilled in steel outer jacket to accomadate instrumentation relative to the base.



Scale : 1" ≡ 10"

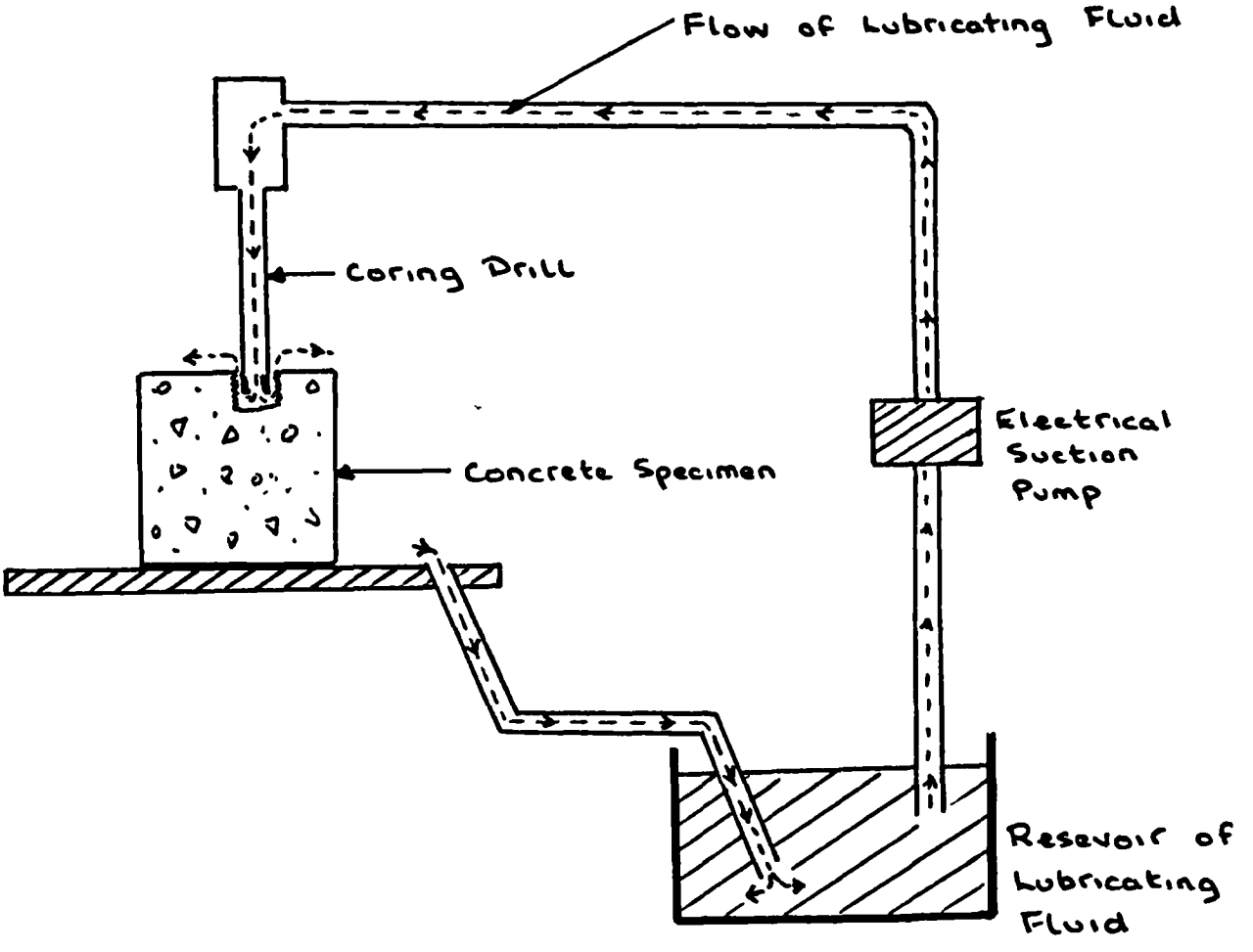
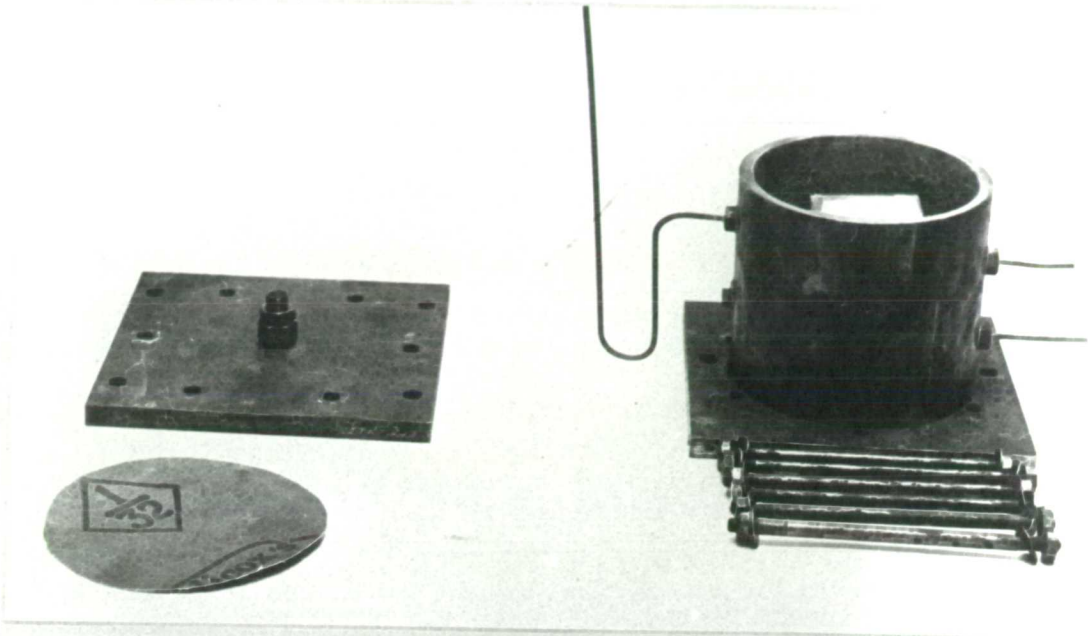


Fig 4:11- Diagrammatic Representation of Lubricating system used in Extracting Cores from Concrete specimens



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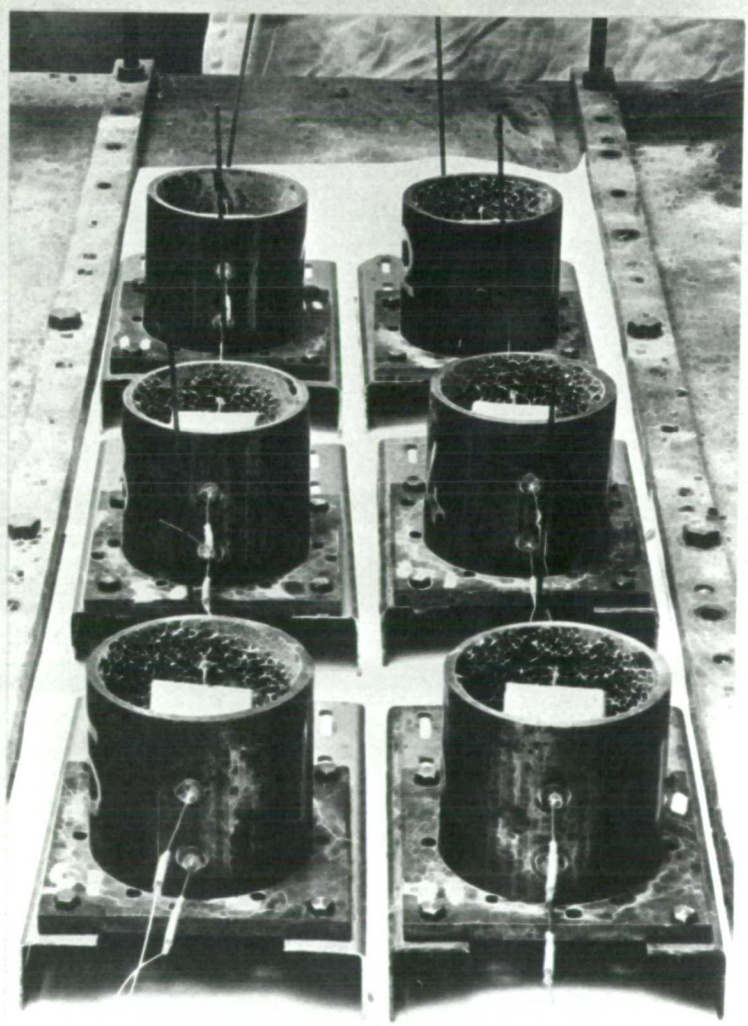

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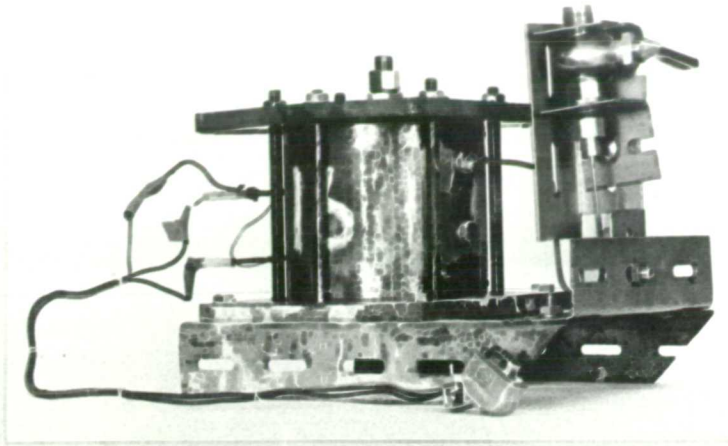

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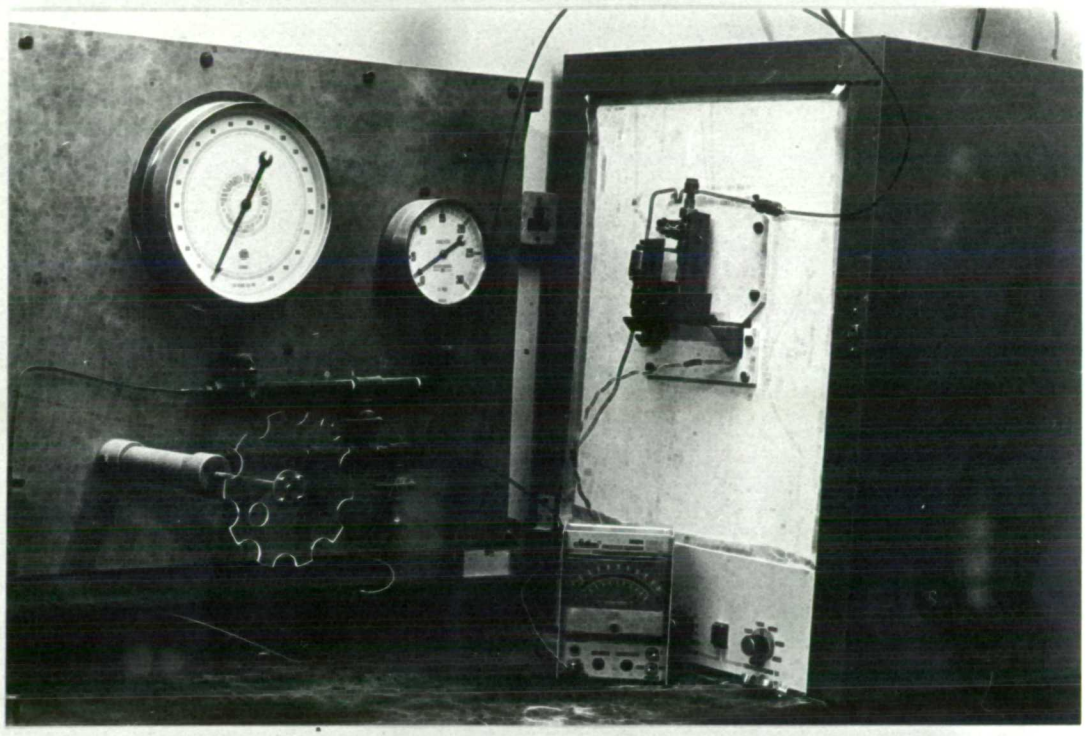

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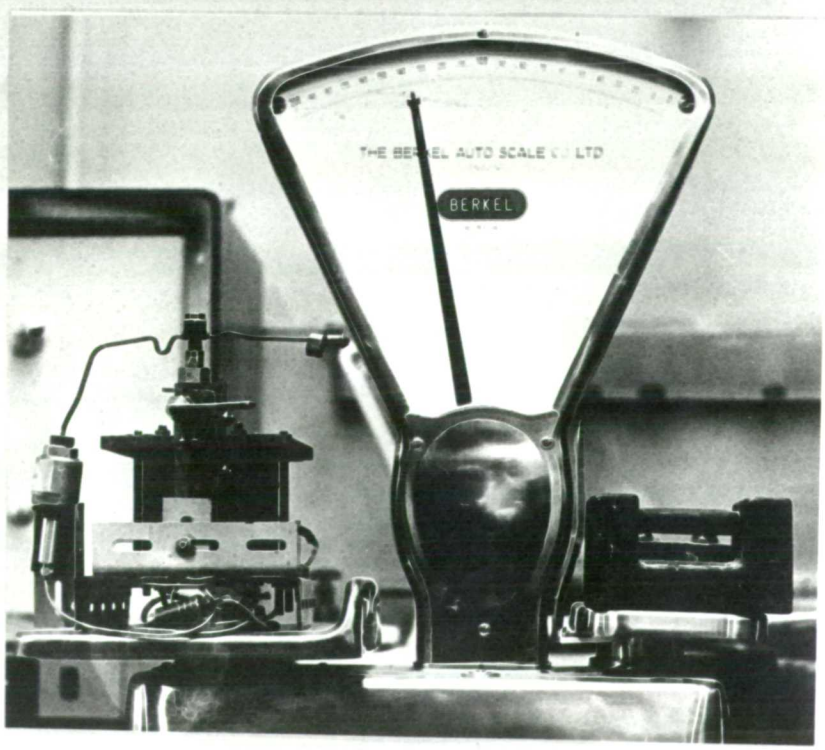

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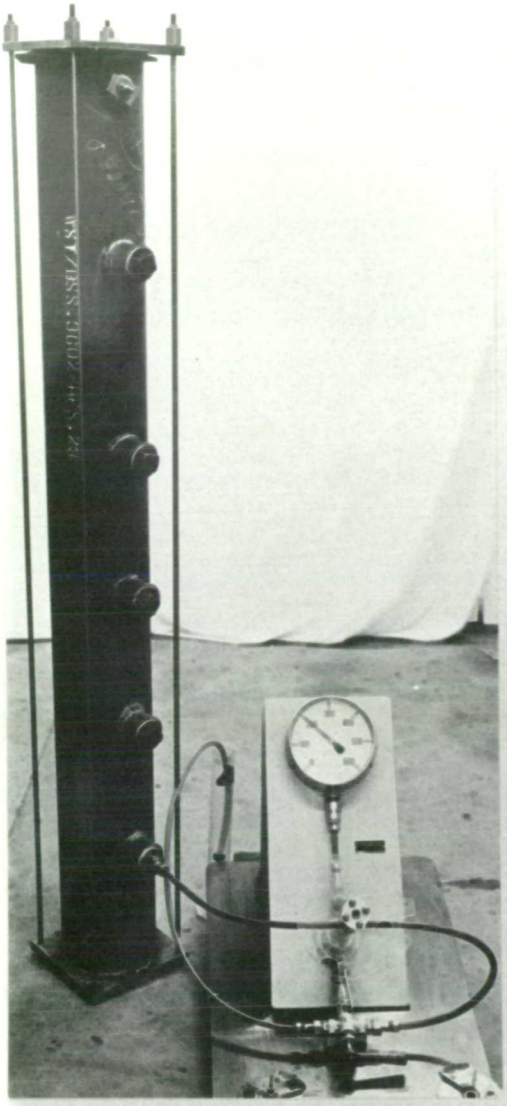

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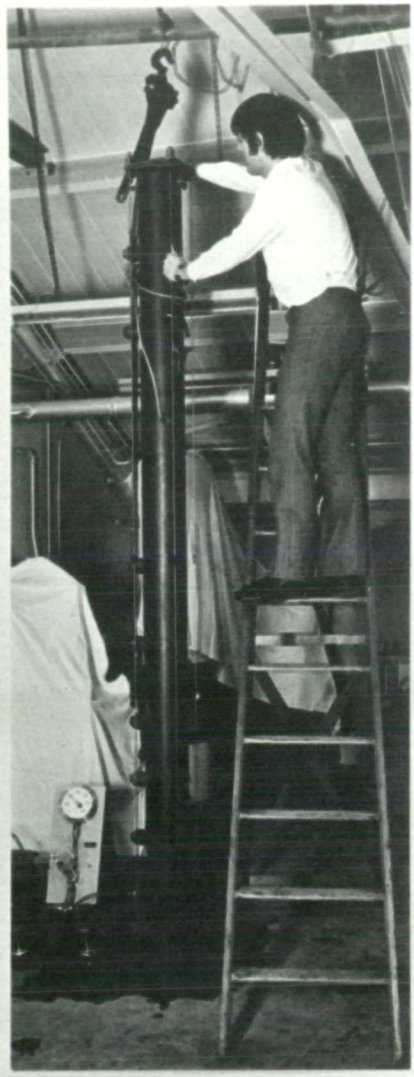

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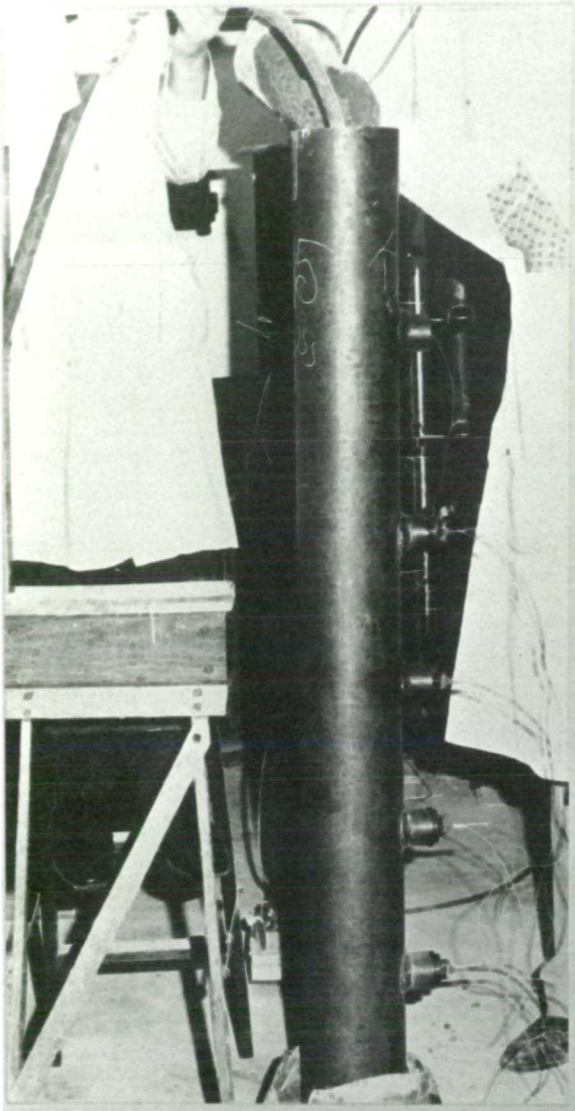

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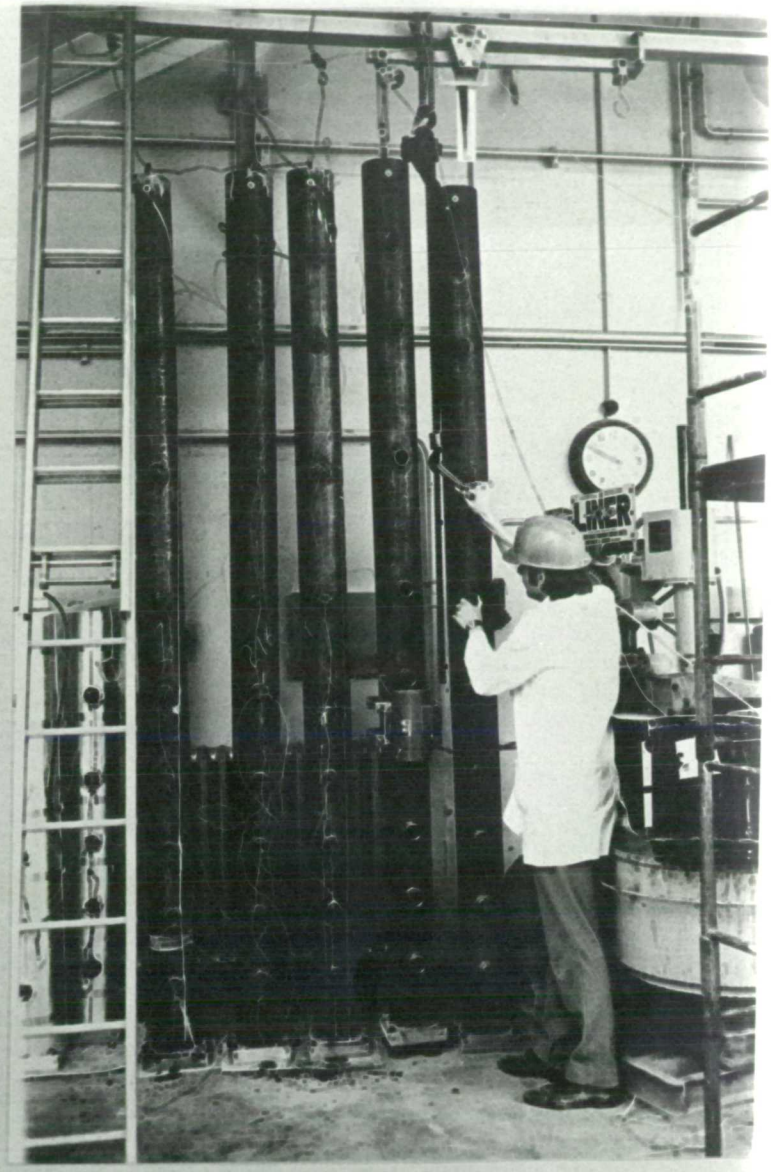

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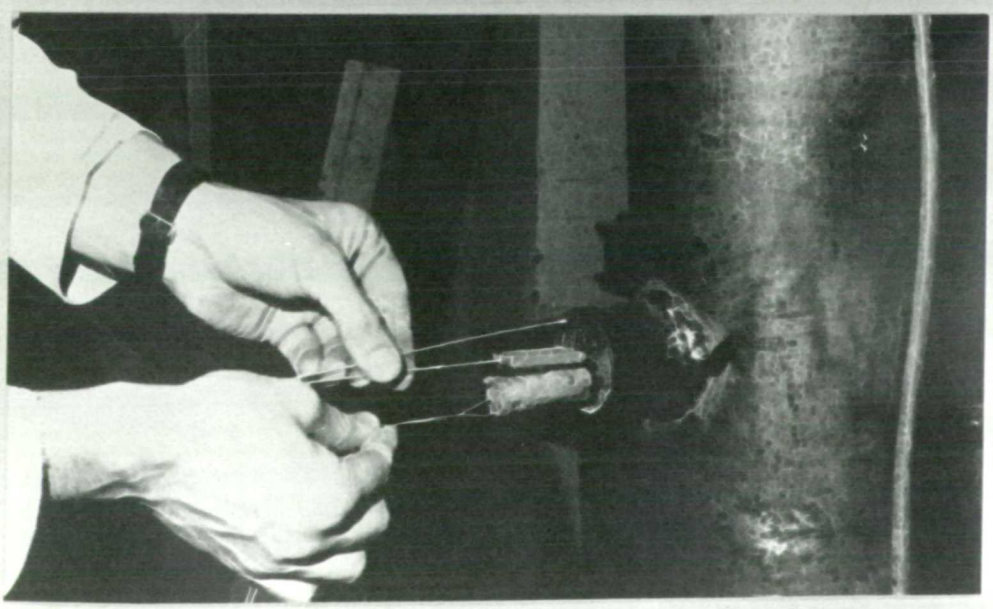

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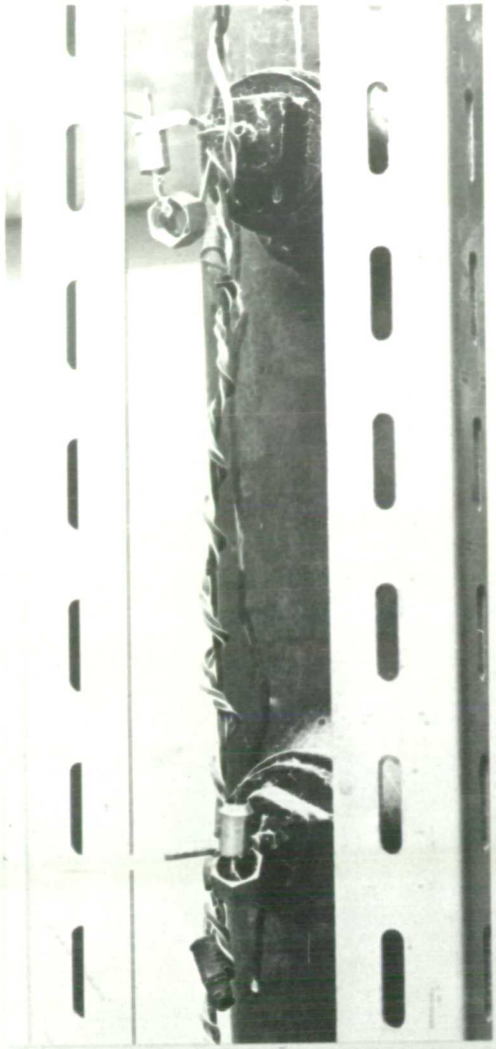

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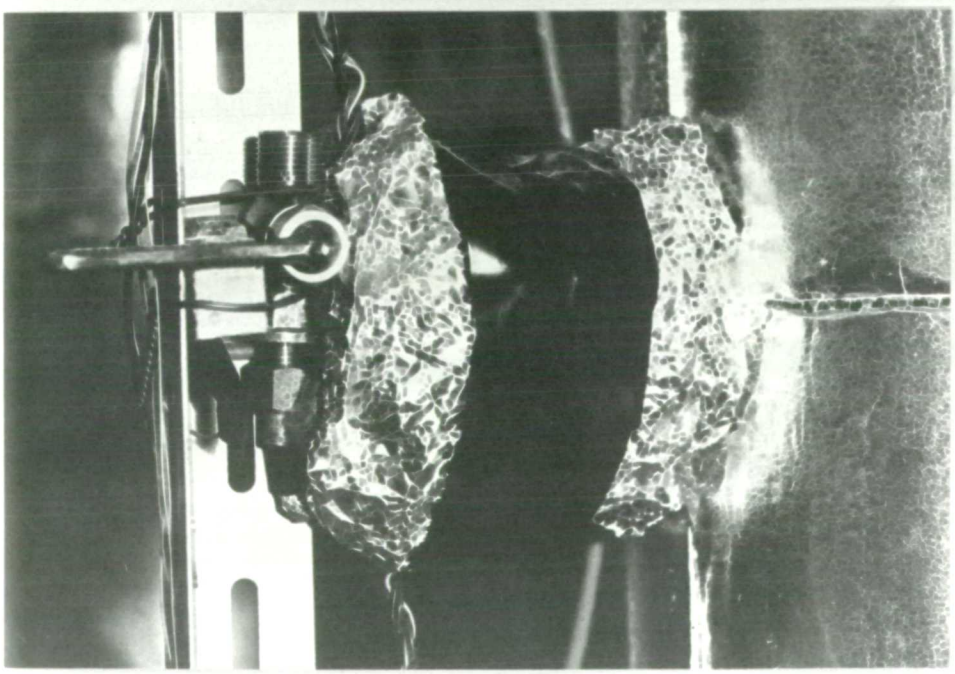
PLATE IV : 12



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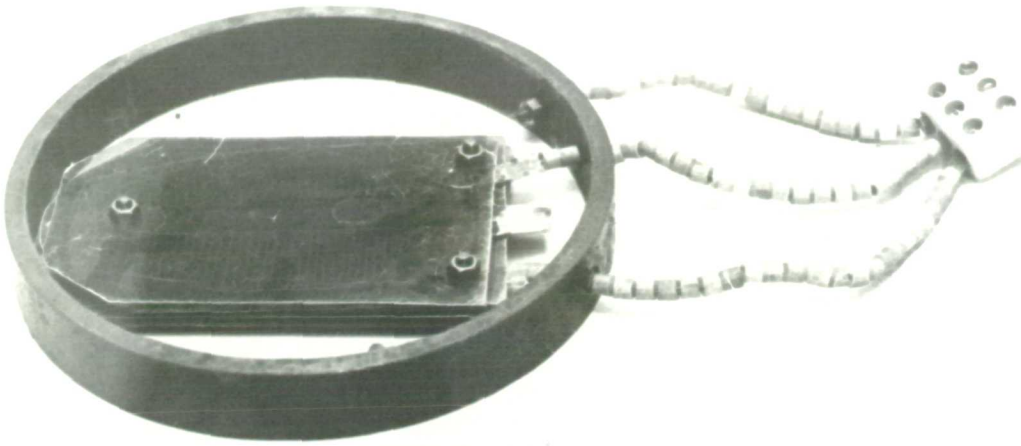

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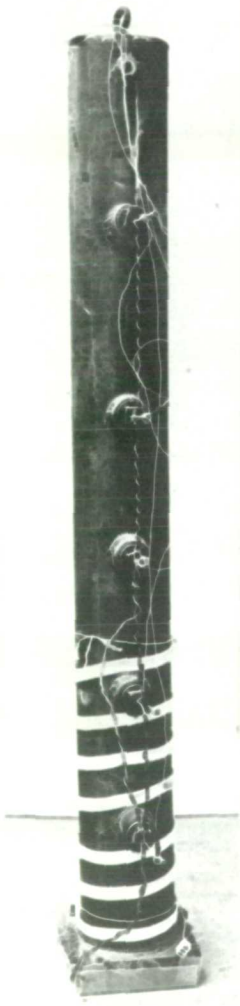

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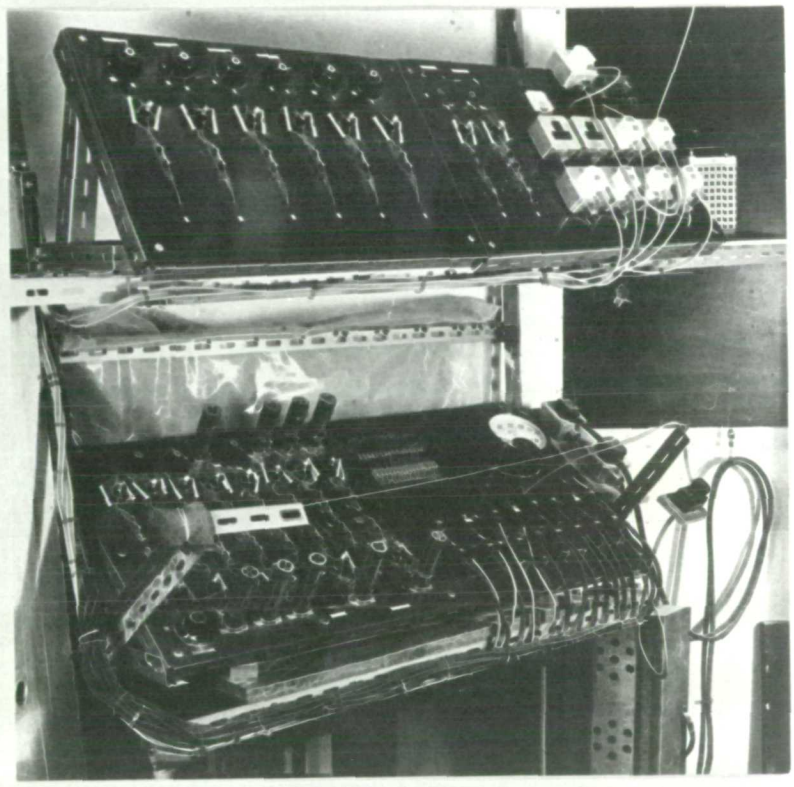

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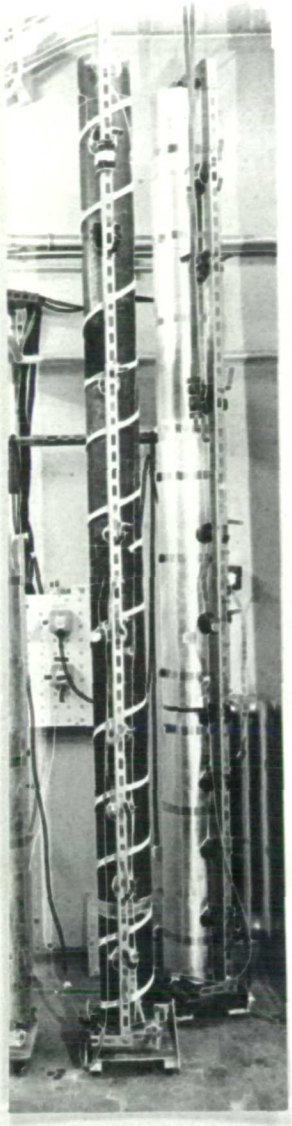
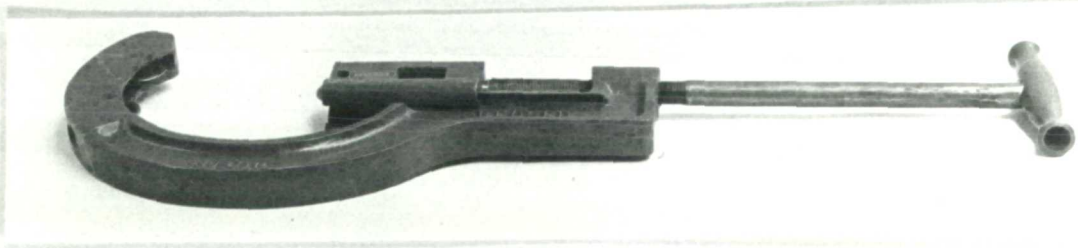


PLATE IV : 17.

PLATE IV : 18



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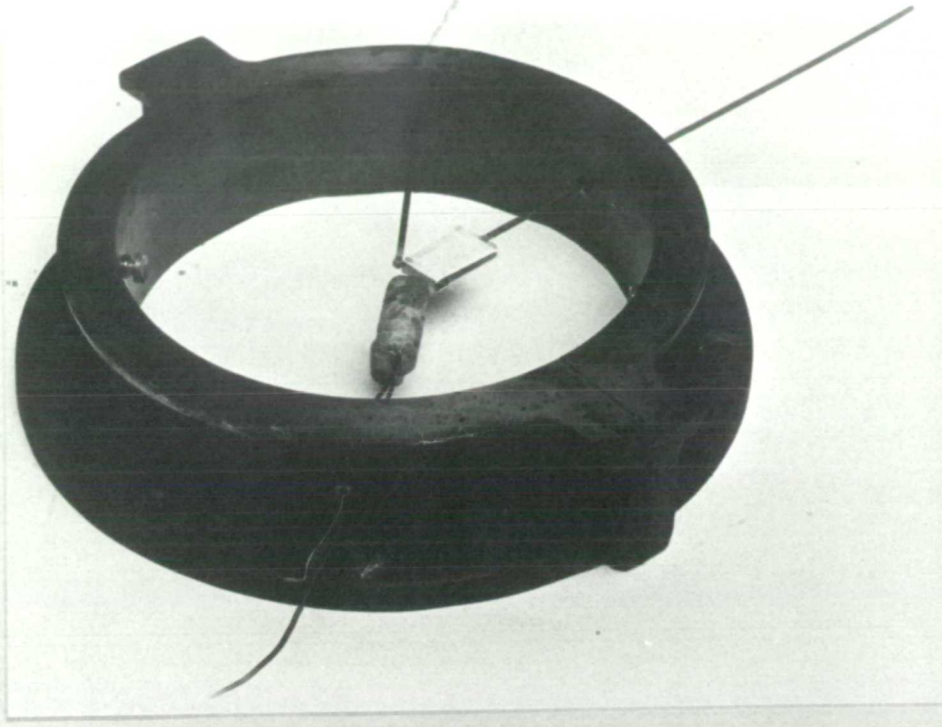

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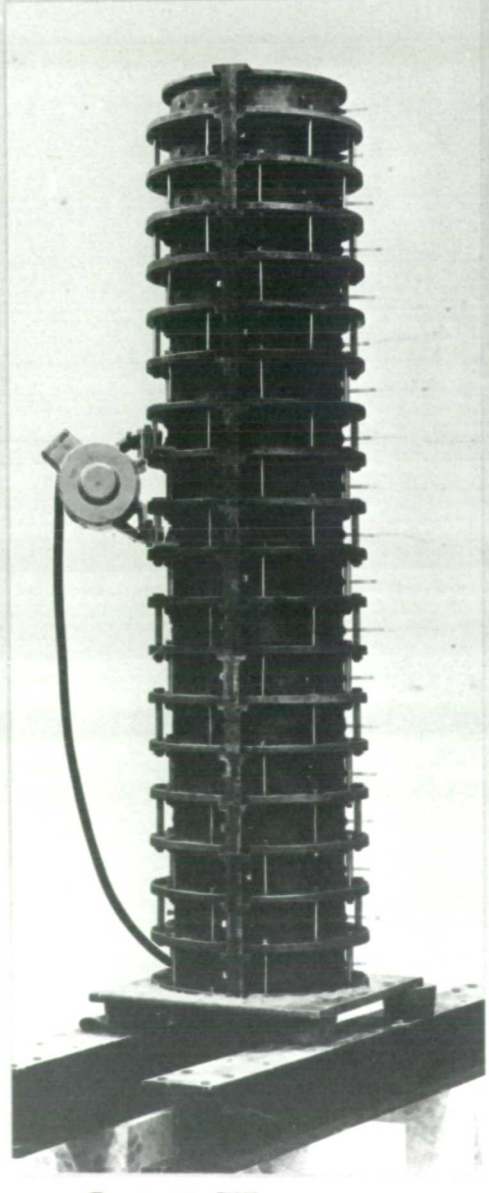

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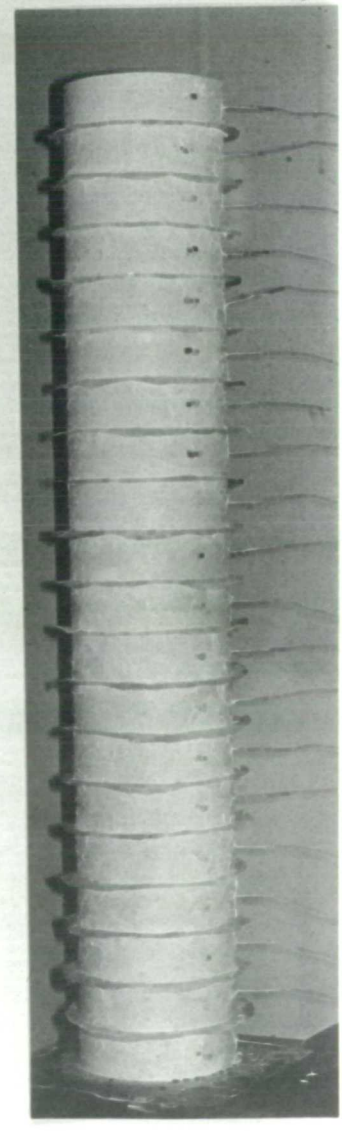

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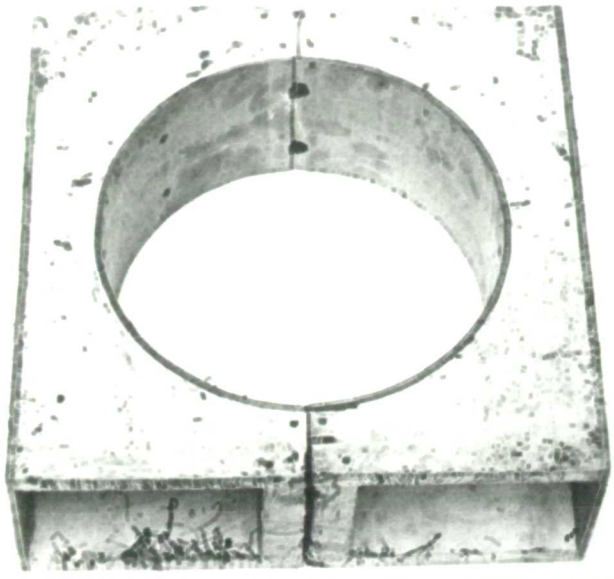

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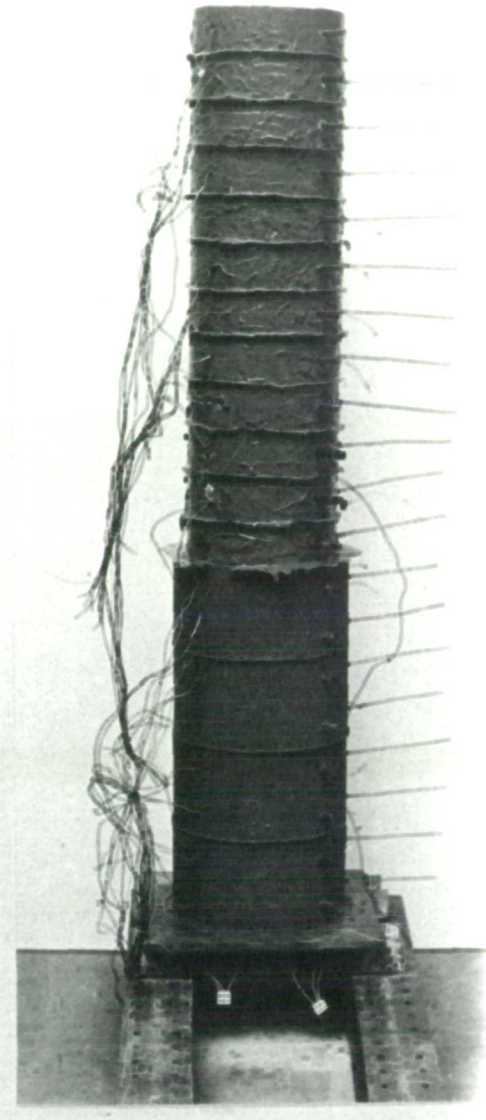

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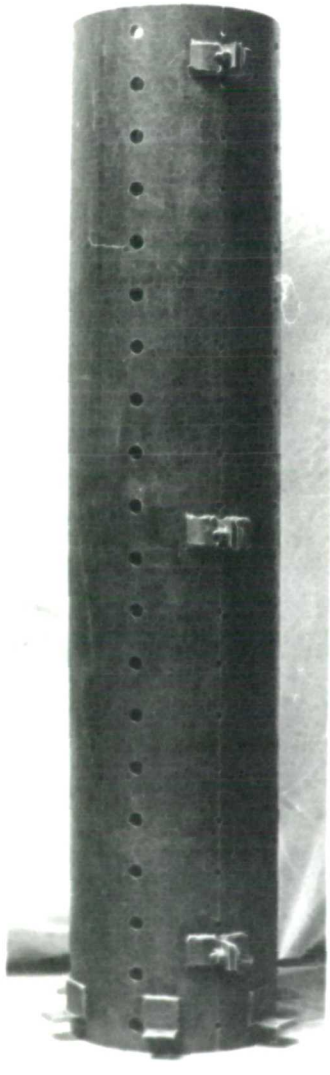
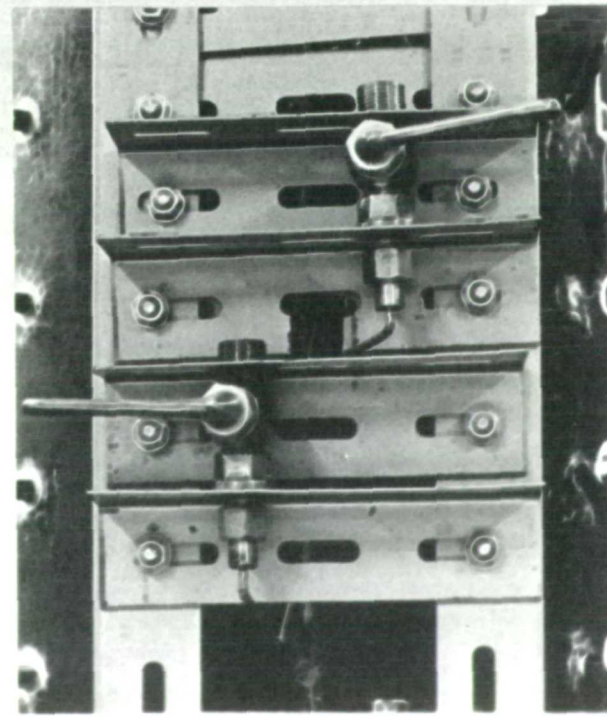


PLATE IV : 26.



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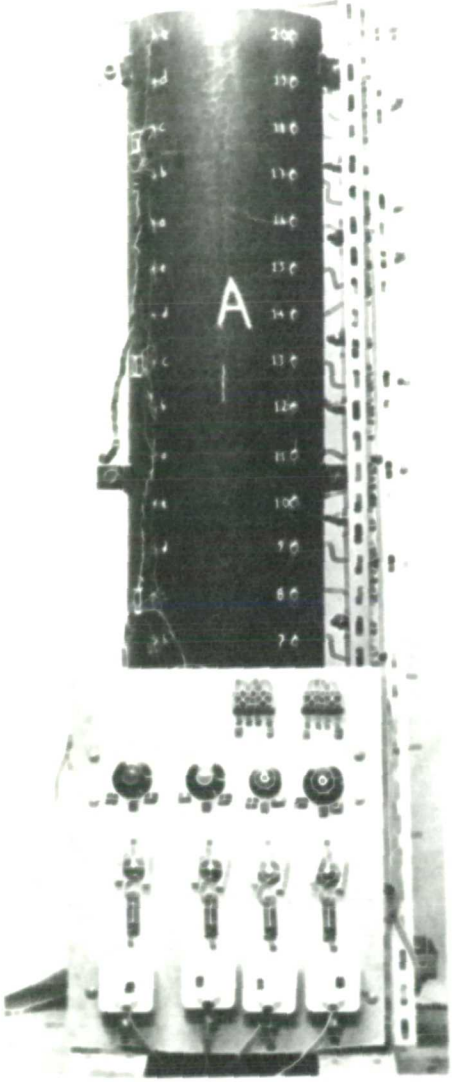


PLATE IV : 28.

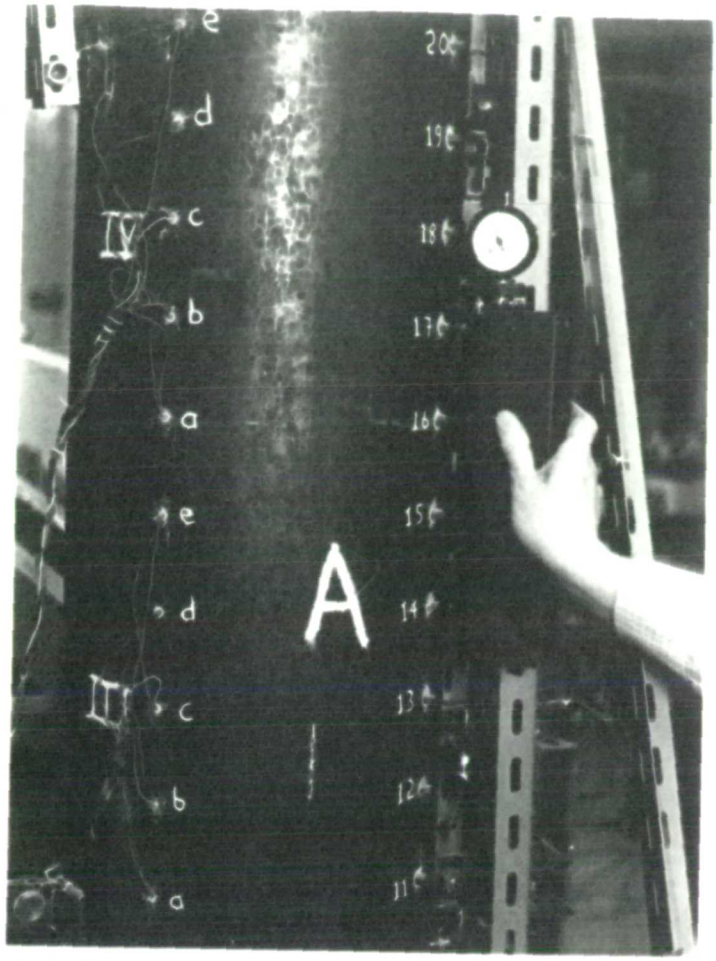
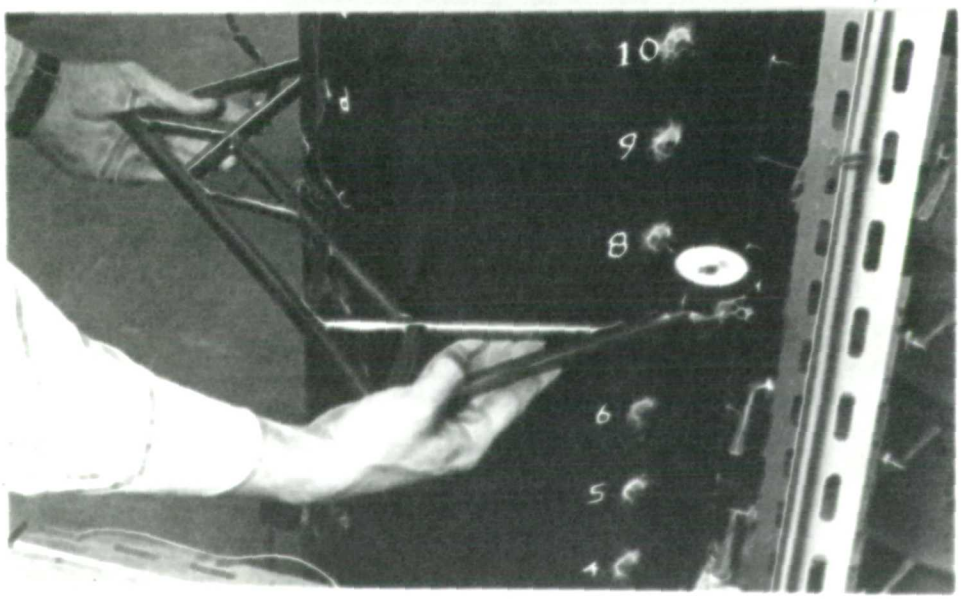


PLATE IV : 29.



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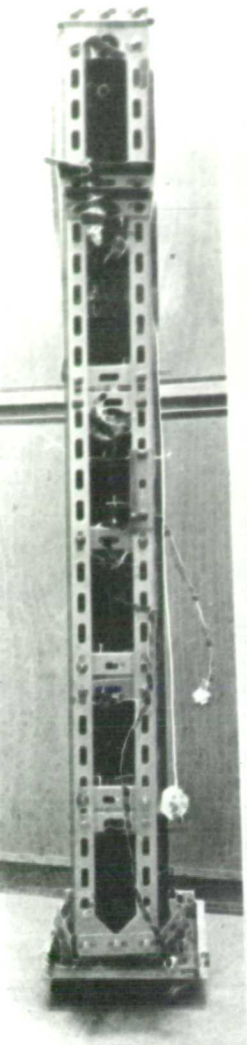


PLATE IV : 31.

PLATE IV : 32.

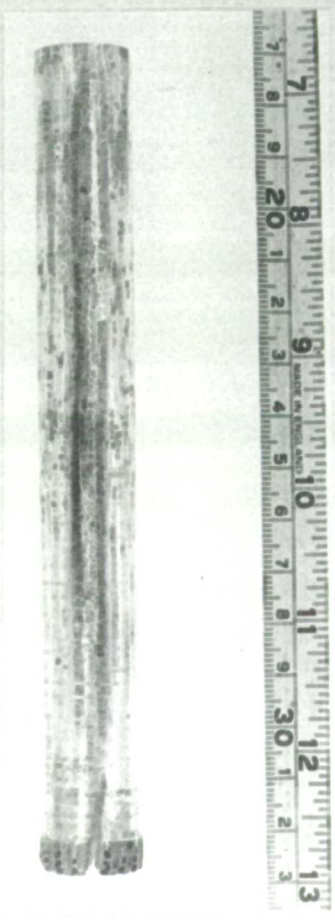


PLATE IV : 33.

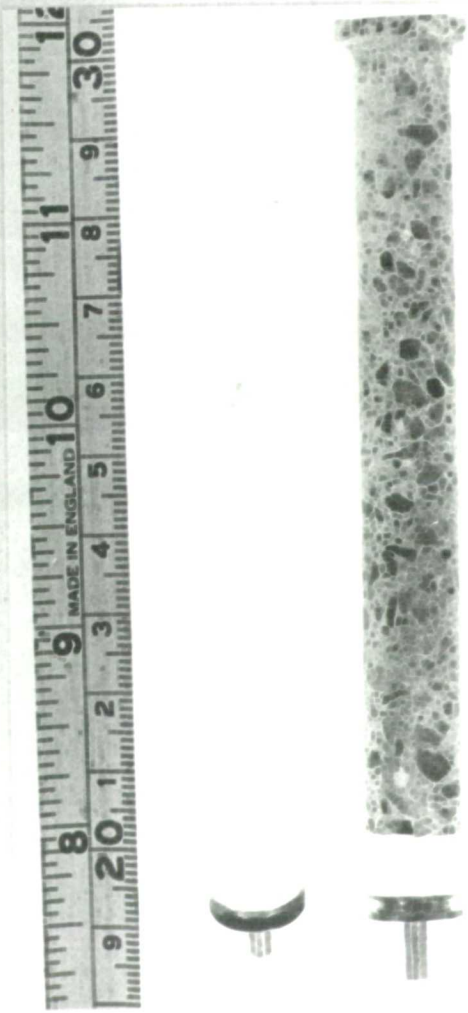


PLATE IV : 34.

CHAPTER FIVE AND APPENDIX I.

FIGURES AND PHOTOGRAPHS.

FIGURES FOR CHAPTER FIVE.

Figure 5:1 - Graph of Gauge Pressure against temperature for Specimen No. 6 on heating to 175°C.

Figure 5:2 - Graph of Gauge Pressure against weight of water remaining in specimen for specimen No. 6 tested at a temperature of 175°C.

Figure 5:3 - Graph of Gauge Pressure against temperature for Specimen No. 14 on heating to 175°C.

Figure 5:4 - Graph of Gauge Pressure against weight of water remaining in specimen for specimen No. 14 tested at a temperature of 175°C.

Figure 5·5 - Graph of Gauge Pressure against temperature for specimen No. 10 which was sealed and tested at 125°C at various losses of weight.

Figure 5:6 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens with an average age at test of one year at various temperatures.

Figure 5:7 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens with an average age at test of 49 days at various temperatures.

Figure 5:8 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens tested at 105°C of various ages.

Figure 5·9 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens tested at 125°C of various ages.

Figure 5·10 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens tested at 150°C of various ages.

Figure 5:11 - Graph of Gauge Pressure against total water content per unit weight of cement for specimens tested at 175°C of various ages.

PHOTOGRAPHS FOR CHAPTER FIVE.

Plate V:9 - 105°C Release Test Specimen

Plate V:10 - 105°C Release Test Specimen

Plate V:11 - 150°C Release Test Specimen

Plate V.12 - 150°C Release Test Specimen

Plate V:13 - 150°C Release Test Specimen

Plate V:14 - 150°C Release Test Specimen

Plate V:15 - 150°C Release Test Specimen

Plate V:16 - 150°C Release Test Specimen

Plate V:17 - 175°C Release Test Specimen

Plate V·18 - 175°C Release Test Specimen

Plate V:19 - 175°C Release Test Specimen

Plate V:20 - 175°C Release Test Specimen

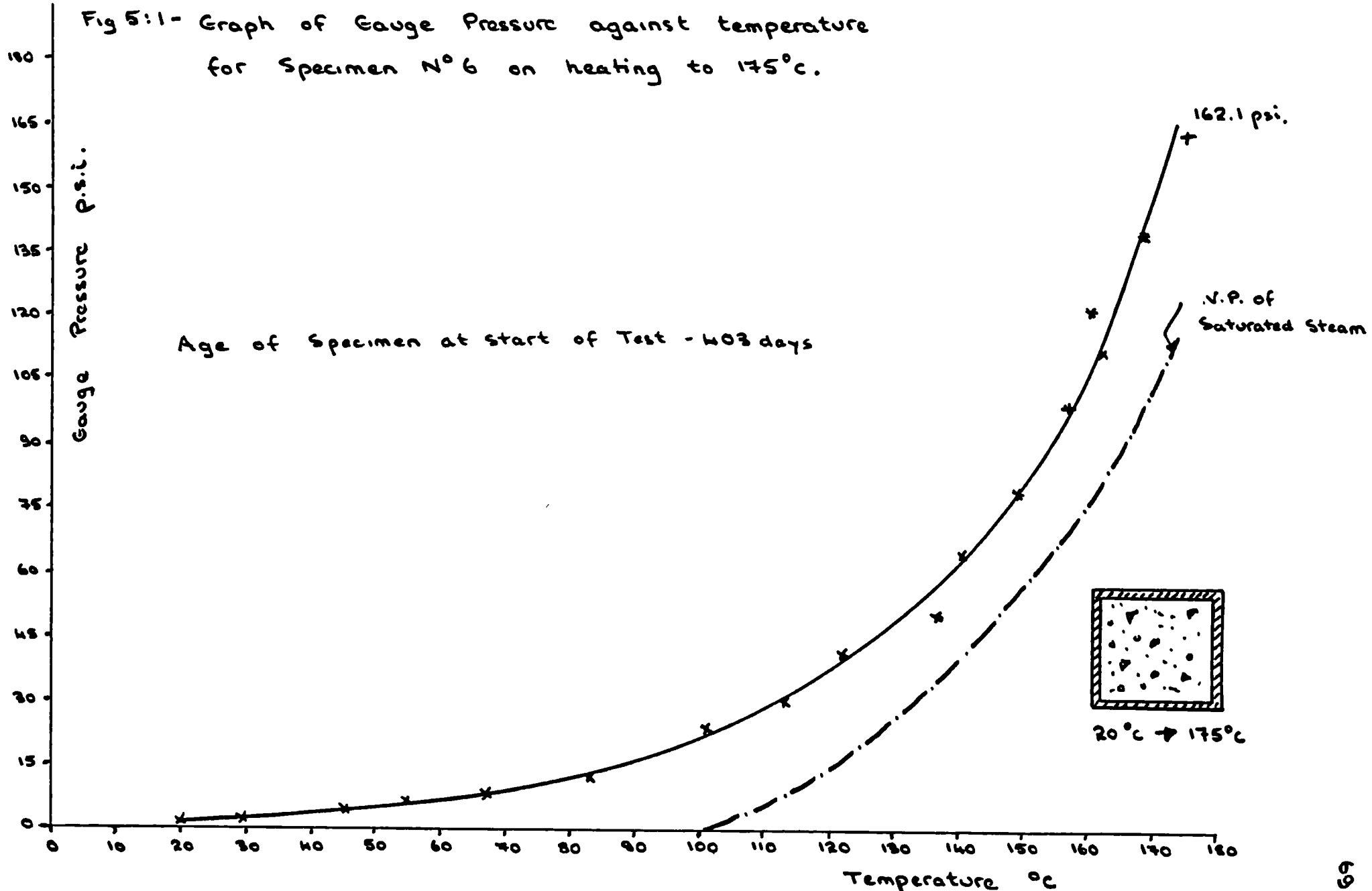
Plate V·21 - 200°C Heated Specimen

Plate V.22 - 200°C Heated Specimen

Plate V.23 - 200°C Heated Specimen

Plate V 24 - 200°C Heated Specimen

Fig 5:1- Graph of Gauge Pressure against temperature for Specimen N° 6 on heating to 175°c.



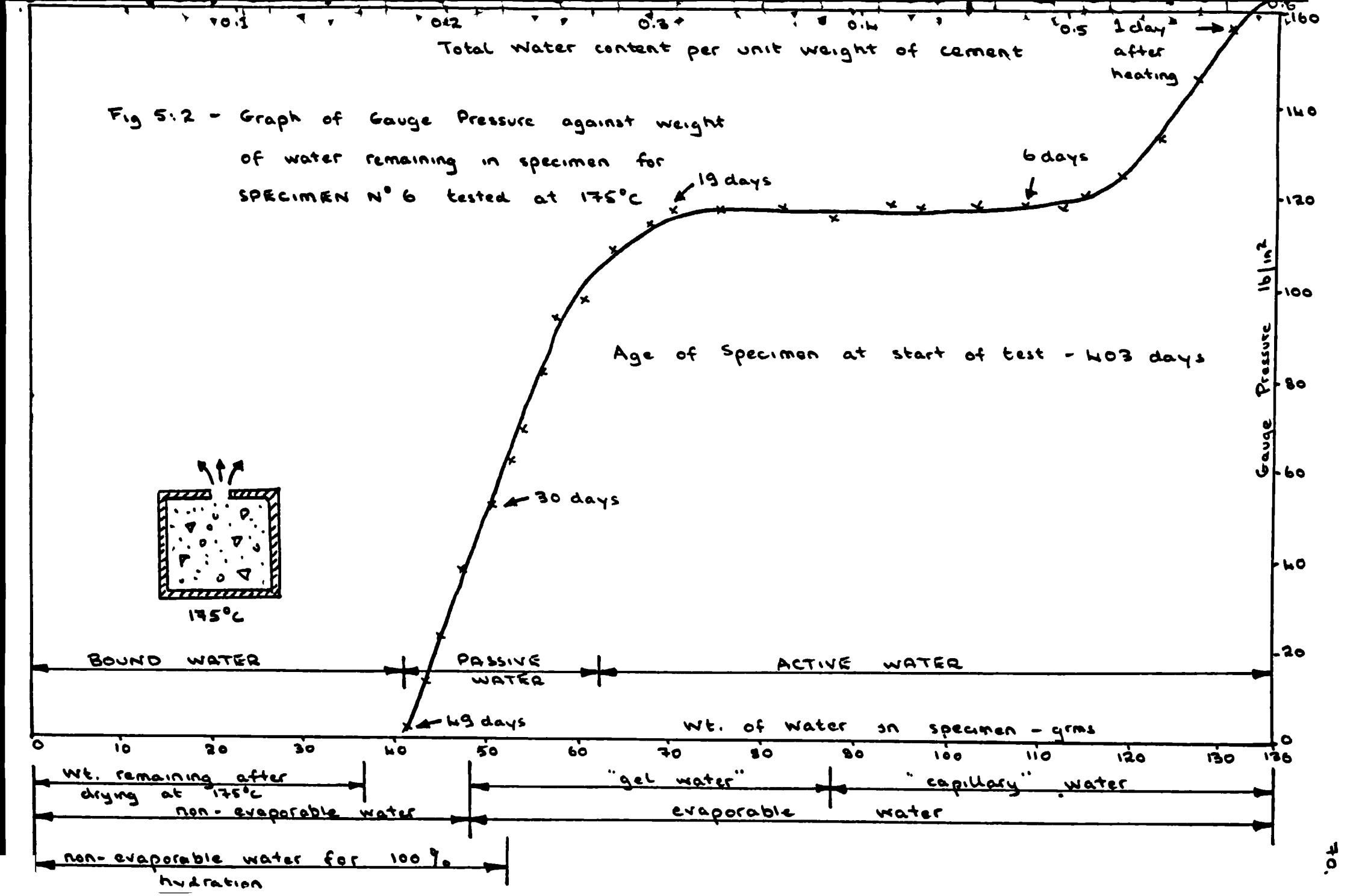
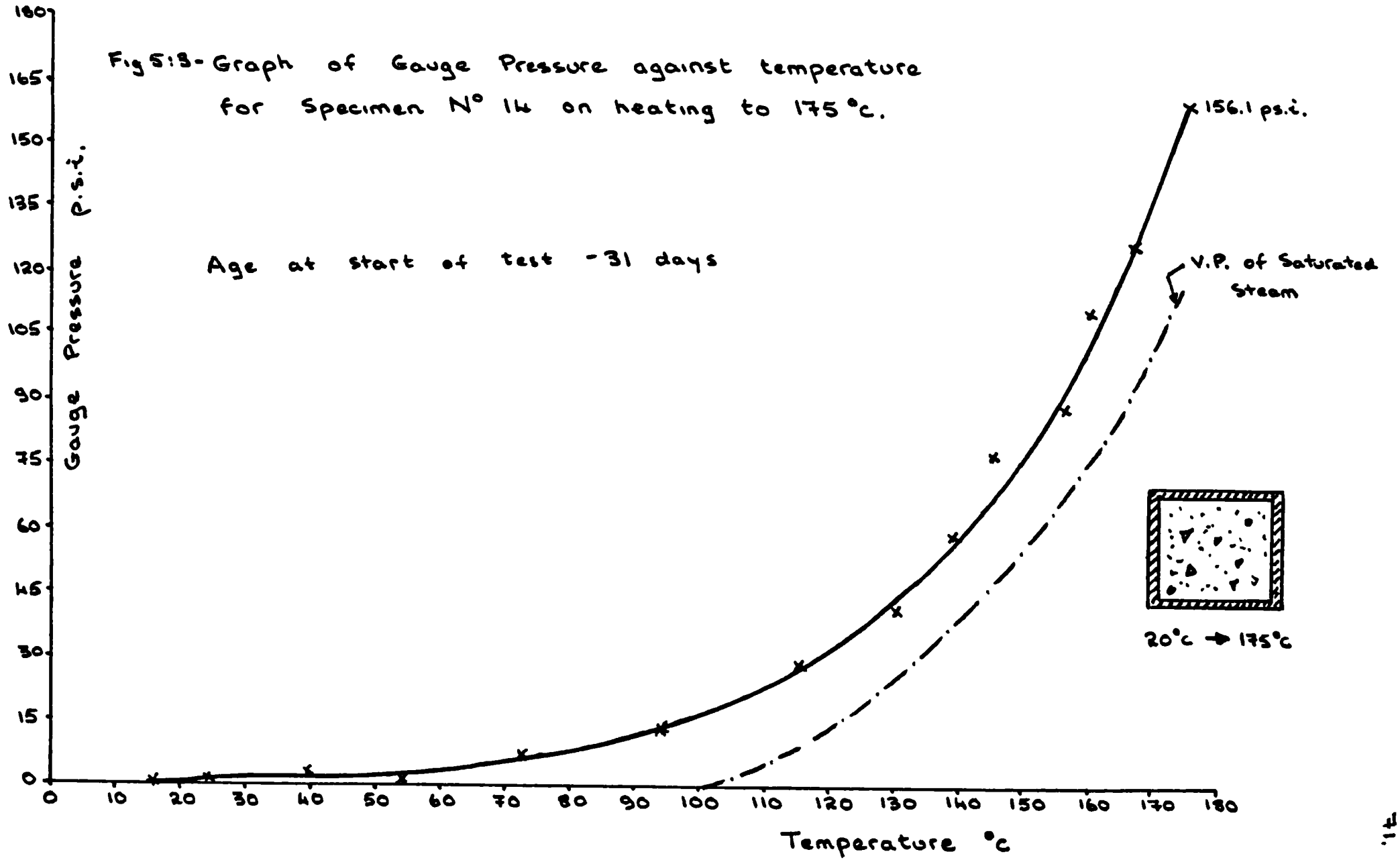

0.1
0.2
0.3
0.4
0.5
0.6
Total water content per unit weight of cement
1 day after heating
Fig 5:2 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 6 tested at 175°C
19 days
6 days
30 days
49 days
Age of Specimen at start of test - 403 days
Gauge Pressure lb/in²
160
140
120
100
80
60
40
20
0
175°C
BOUND WATER
PASSIVE WATER
ACTIVE WATER
Wt. of water in specimen - grms
0
10
20
30
40
50
60
70
80
90
100
110
120
130
136
Wt. remaining after drying at 175°C
non-evaporable water
"gel water"
"capillary" water
evaporable water
non-evaporable water for 100% hydration

Fig 5:8- Graph of Gauge Pressure against temperature for Specimen N° 14 on heating to 175 °c.



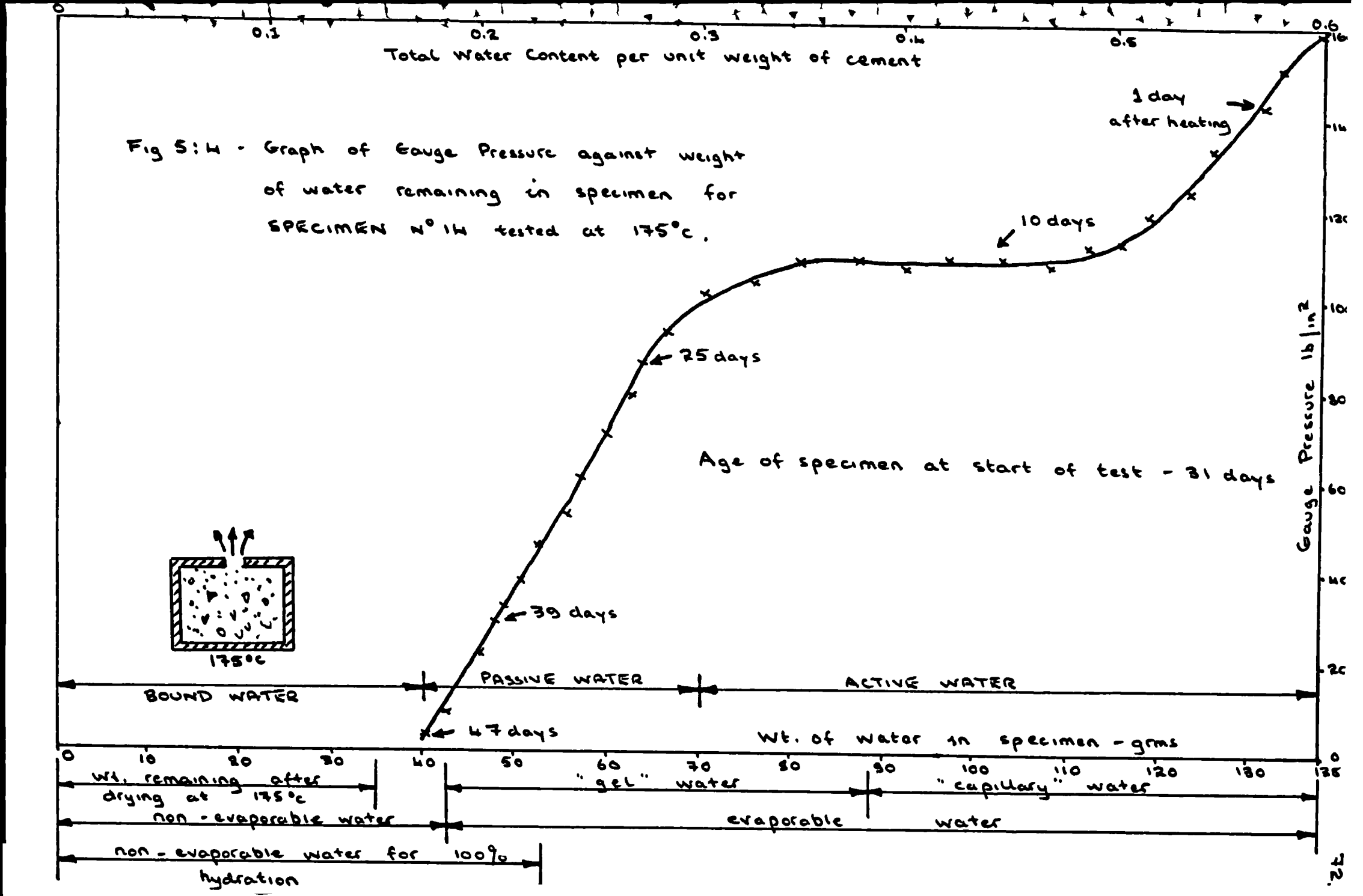
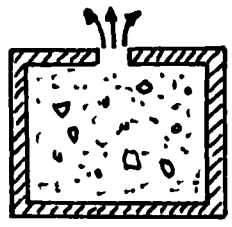


Fig 5:4 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 1H tested at 175°c.

Fig 5:5 - Graph of Gauge Pore Pressure against temperature for Specimen 10, which was sealed and tested at 125°c at various losses of weight



Wt. loss 73.0g - 0.528 of Mix water

Wt. loss 76.0g - 0.586 of Mix water

Wt. loss 82.5g - 0.596 of Mix water

Wt. loss 85.0g - 0.615 of Mix water

Wt. loss 88.0g - 0.636 of Mix water

Wt. loss 90.0g - 0.651 of Mix water

Gauge Pressure lb/in²

Temperature °C

Fig 5:6 - Graph of Gauge Pressure against Total water content per unit weight of cement for specimens with an average age at test of one year; various temperatures.

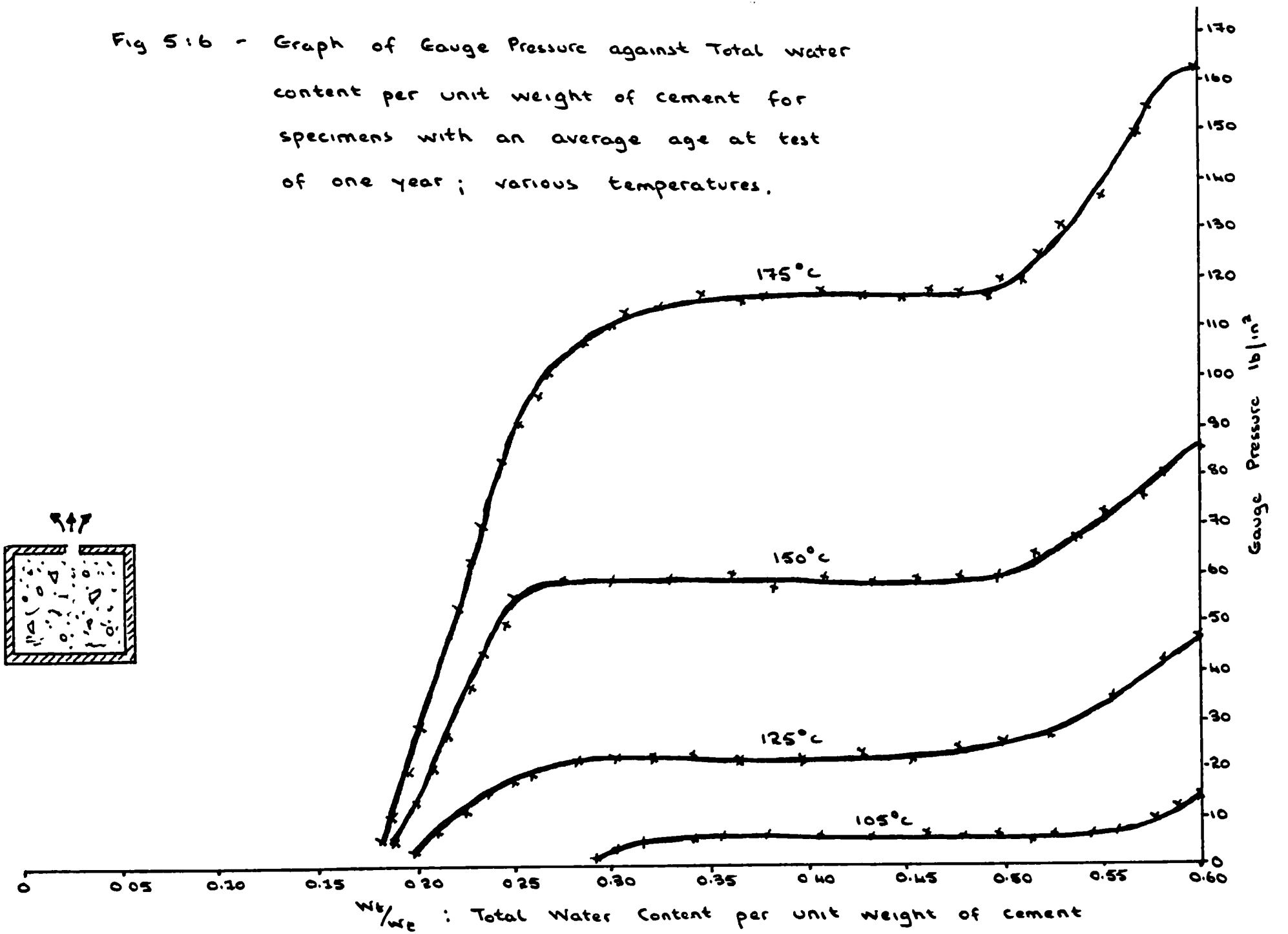


Fig 5:7 - Graph of Gauge Pressure against Total Water Content per unit weight of cement for specimens with an average age at test of 49 days; various temperatures

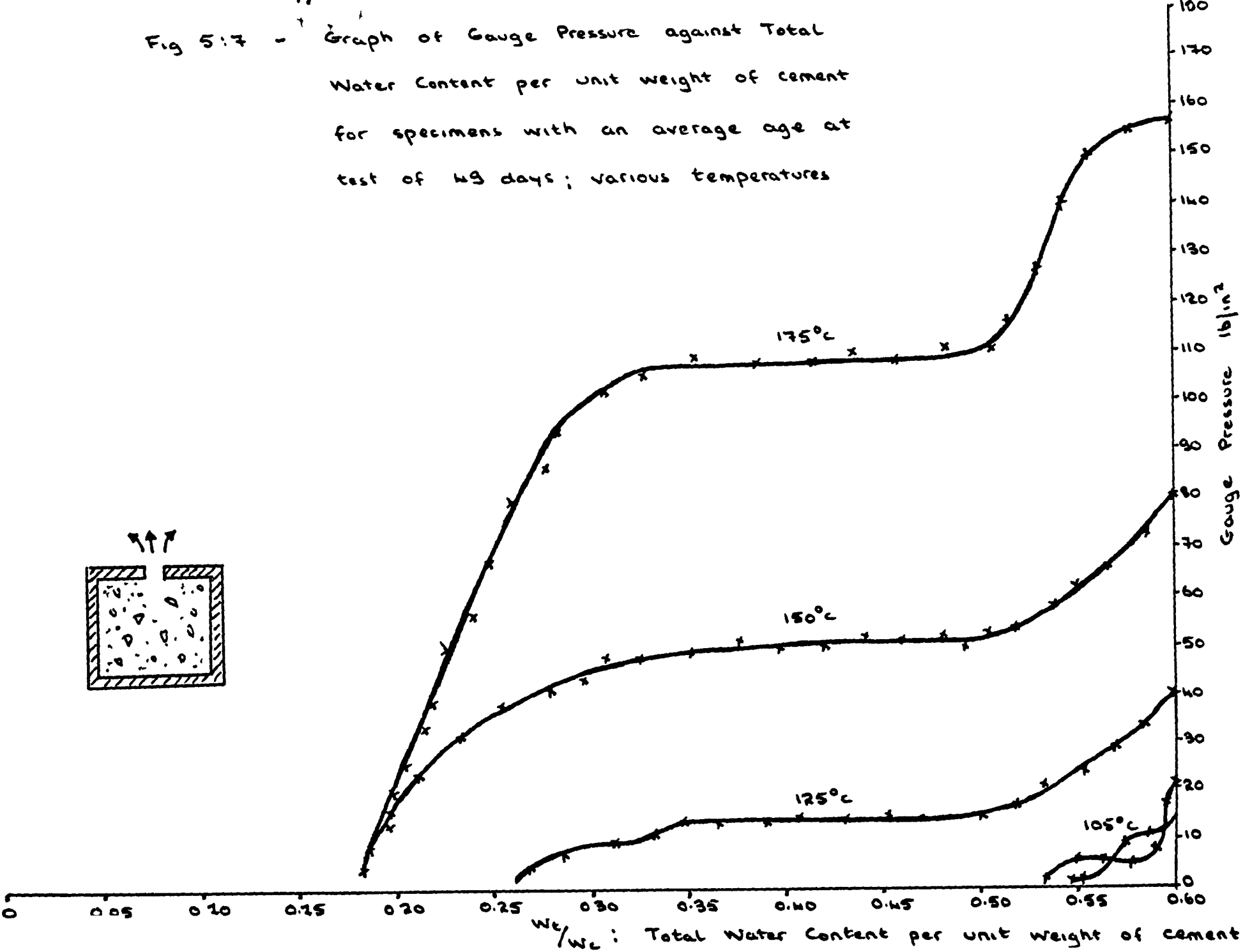


Fig 5:8 - Graph of Gauge Pressure against Total water content per unit weight of cement for specimens tested at 105°c ; various ages

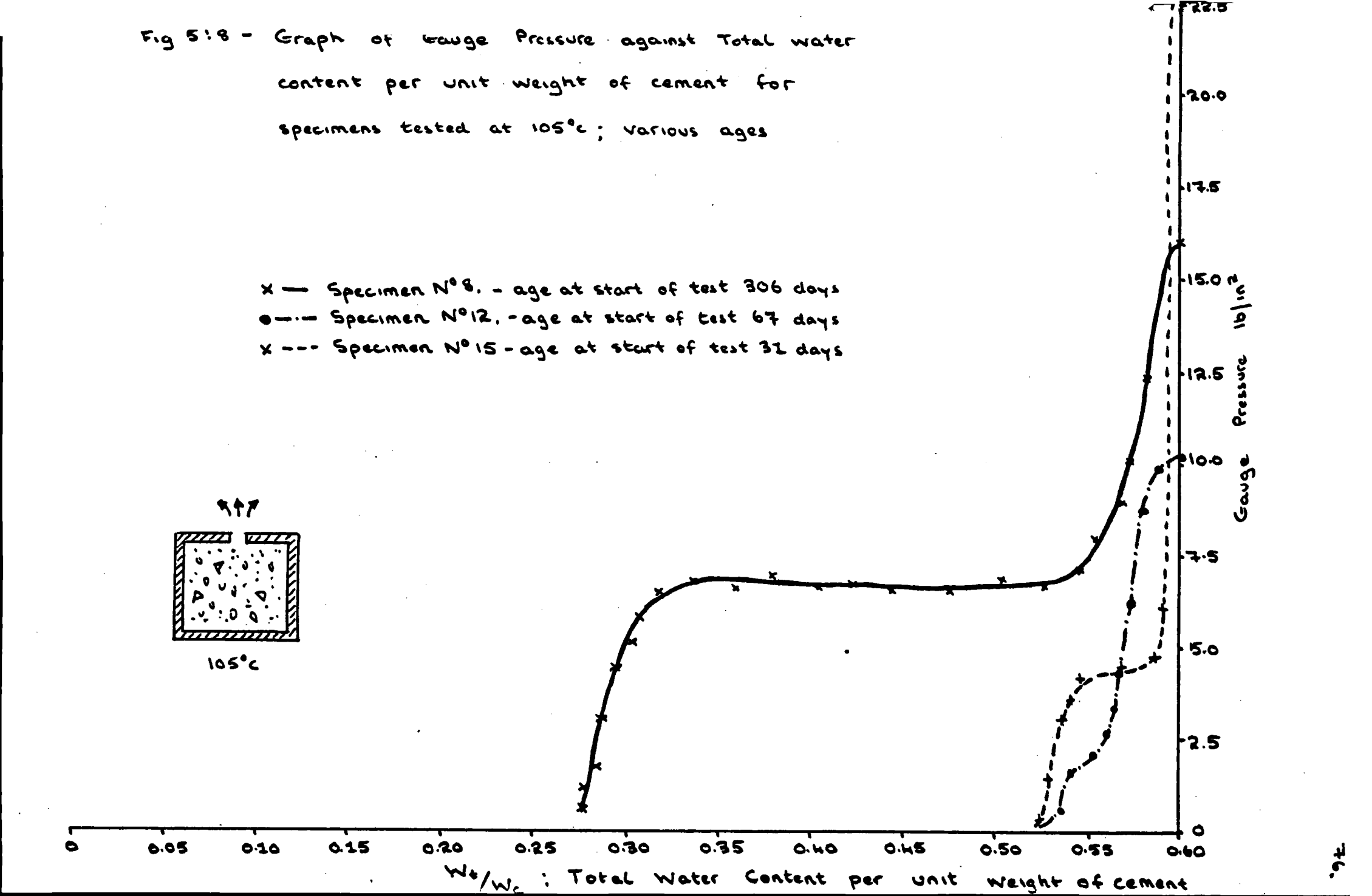
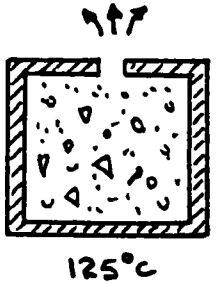


Fig 5:9 - Graph of Gauge Pressure against Total water content per unit weight of cement for specimens tested at 125°c ; various ages.



x — Specimen N°10, age at start of test 370 days

•- - Specimen N°16, age at start of test 74 days

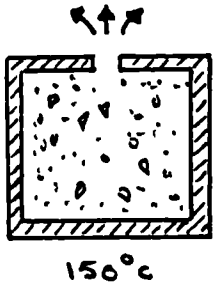
Gauge Pressure lb/in²

0 5 10 15 20 25 30 35 40 45

0.0 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60

W_t/W_c : Total Water Content per unit weight of cement

Fig 5:10 - Graph of Gauge Pressure against Total Water content per unit weight of cement for specimens tested at 150°c ; various ages.



× — Specimen N° 7, age at start of test 361 days

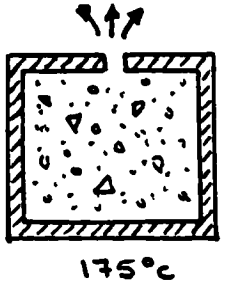
●-- Specimen N° 11, age at start of test 39 days

Gauge Pressure lb/in²

0 10 20 30 40 50 60 70 80

0.0 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60

W_t/W_c : Total Water Content per unit weight of Cement



x — Specimen N° 6, age at start of test 403 days

●-- Specimen N° 14, age at start of test 31 days

Gauge Pressure lb/in²

0 10 20 30 40 50 60 70 80 90 100 110 120

0 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60

W_t/W_c : Total Water content per unit weight of cement

Fig 5 : 12. - Gauge Pressure of Air inside a pore with various initial ratios of liquid water to air, that is raised to temperatures of 105°c, 125°c, 150°c and 175°c, assuming the liquid water expands to compress the air.

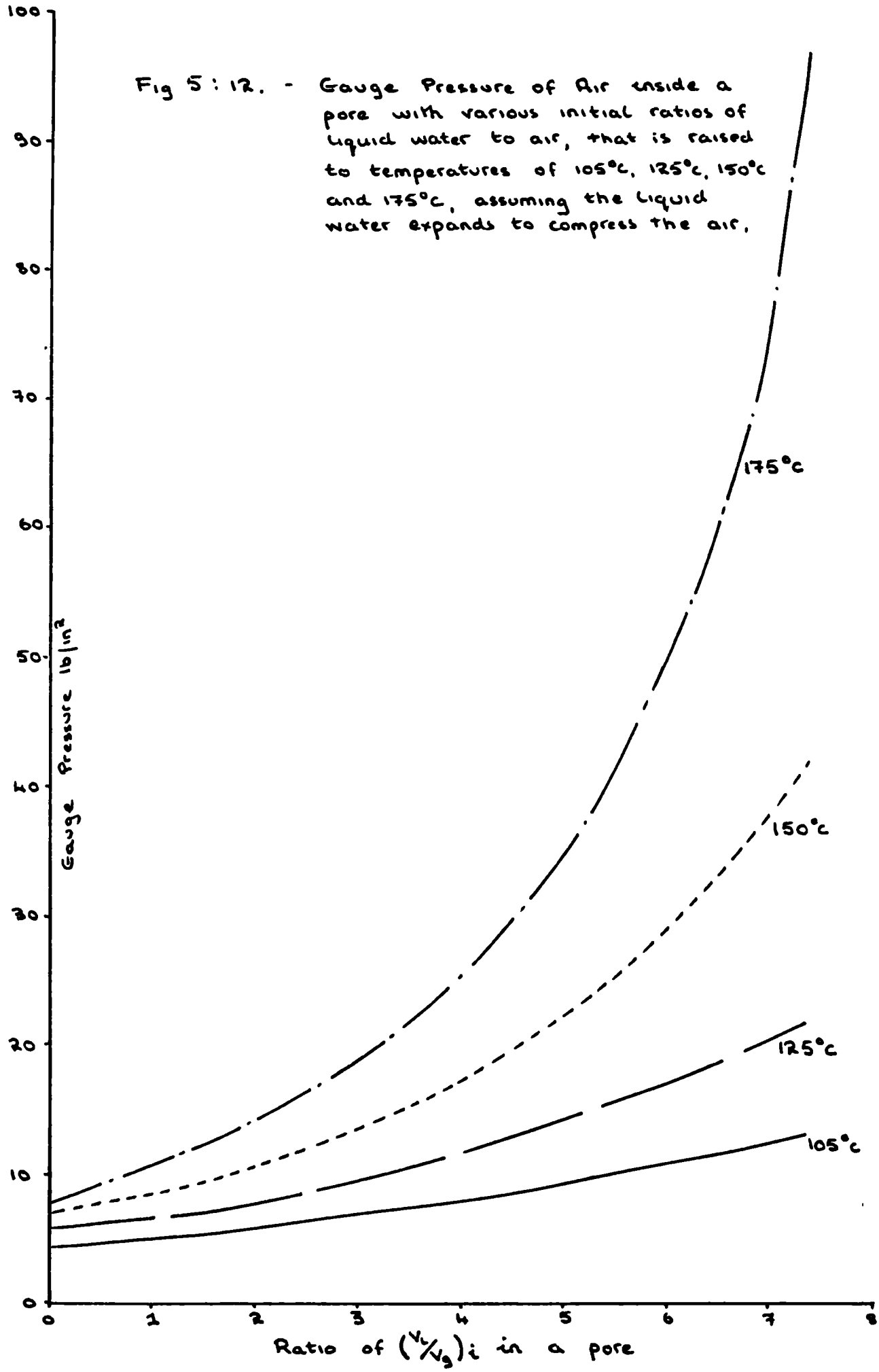


Fig 5:13 - Relationship between the Density of Superheated Steam and the pressure exerted by it at constant temperatures of 105°c, 125°c, 150°c and 175°c (89)

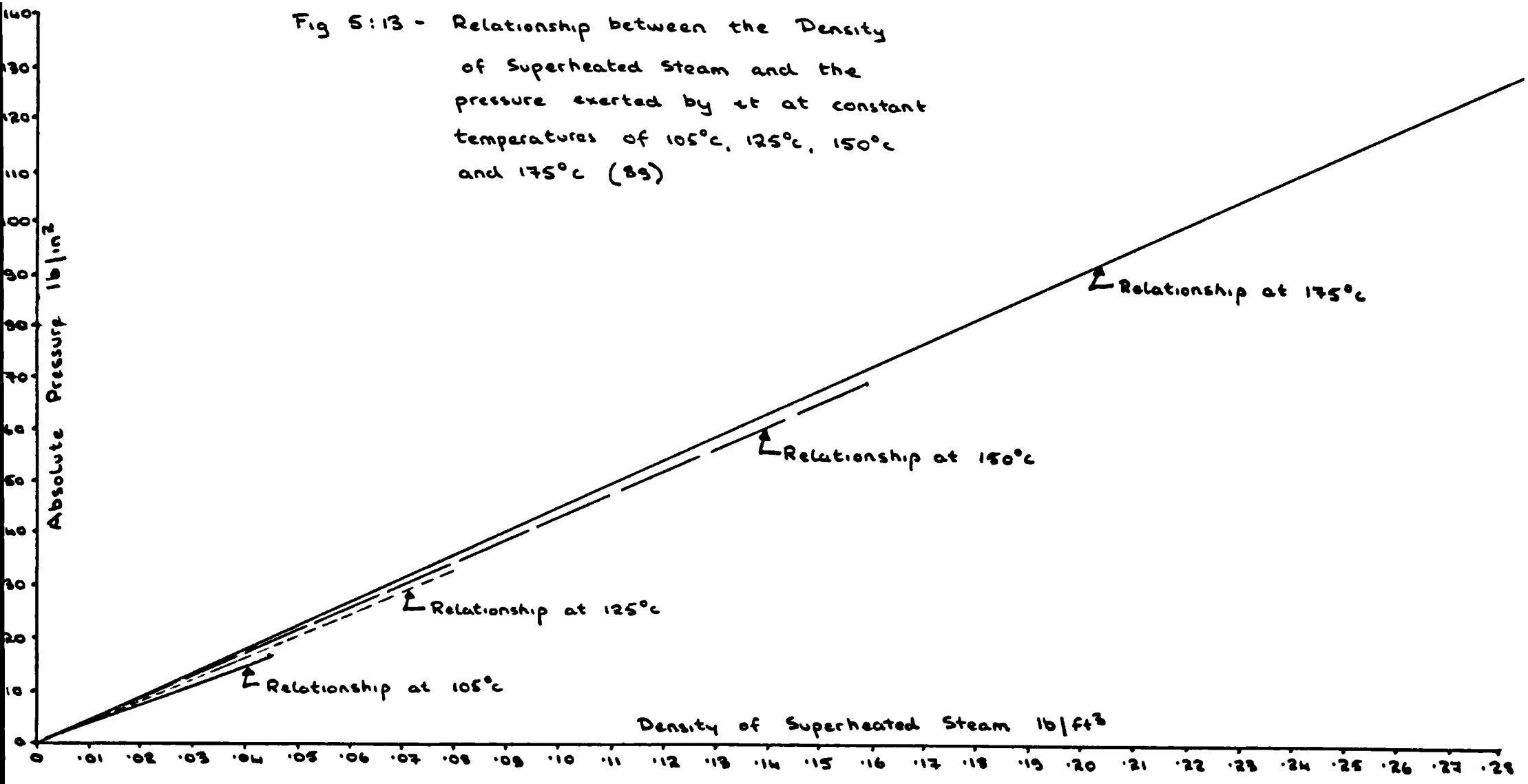


Fig 5:14 - Relationship between Pore Pressure and Fluid Loss inside the Idealised Model at various temperatures

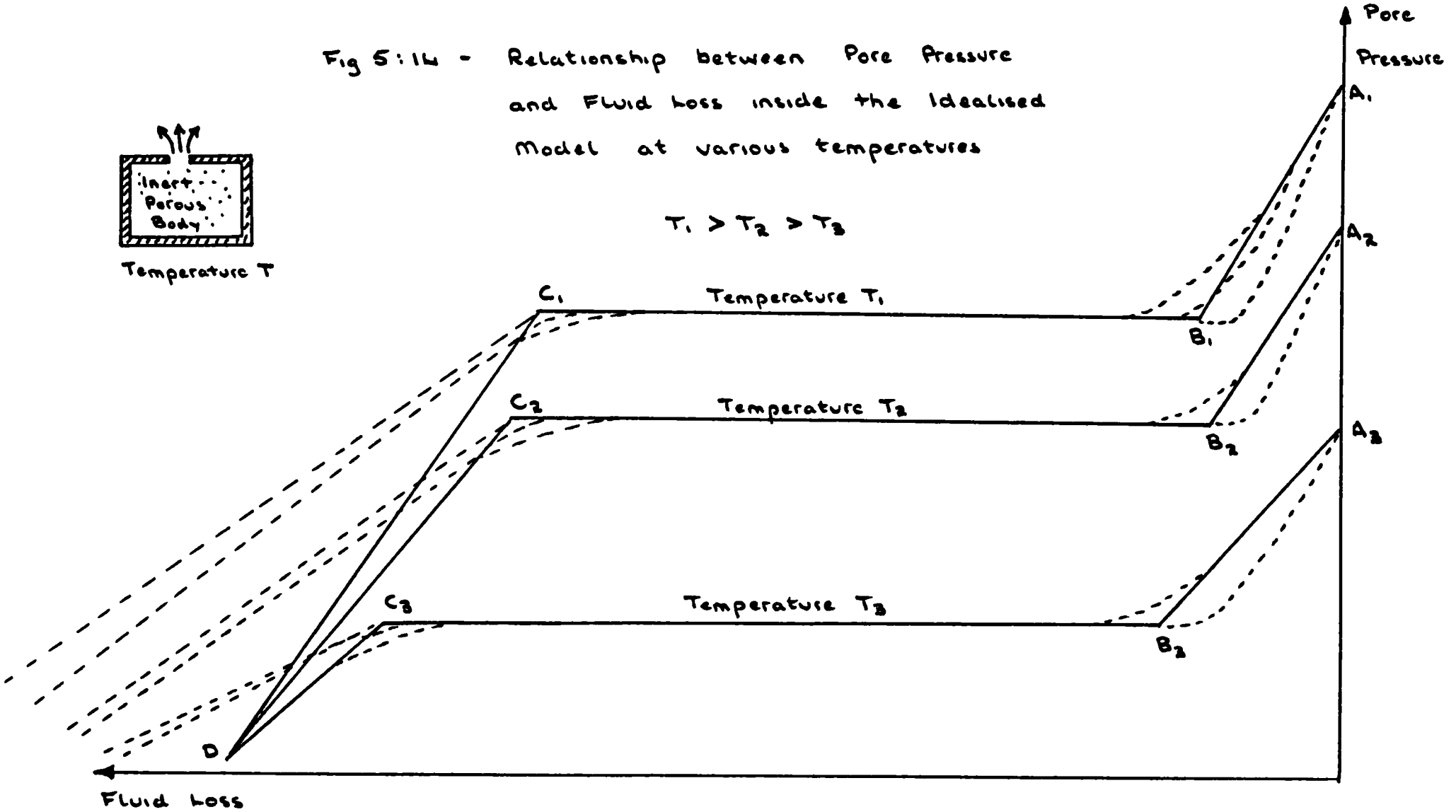
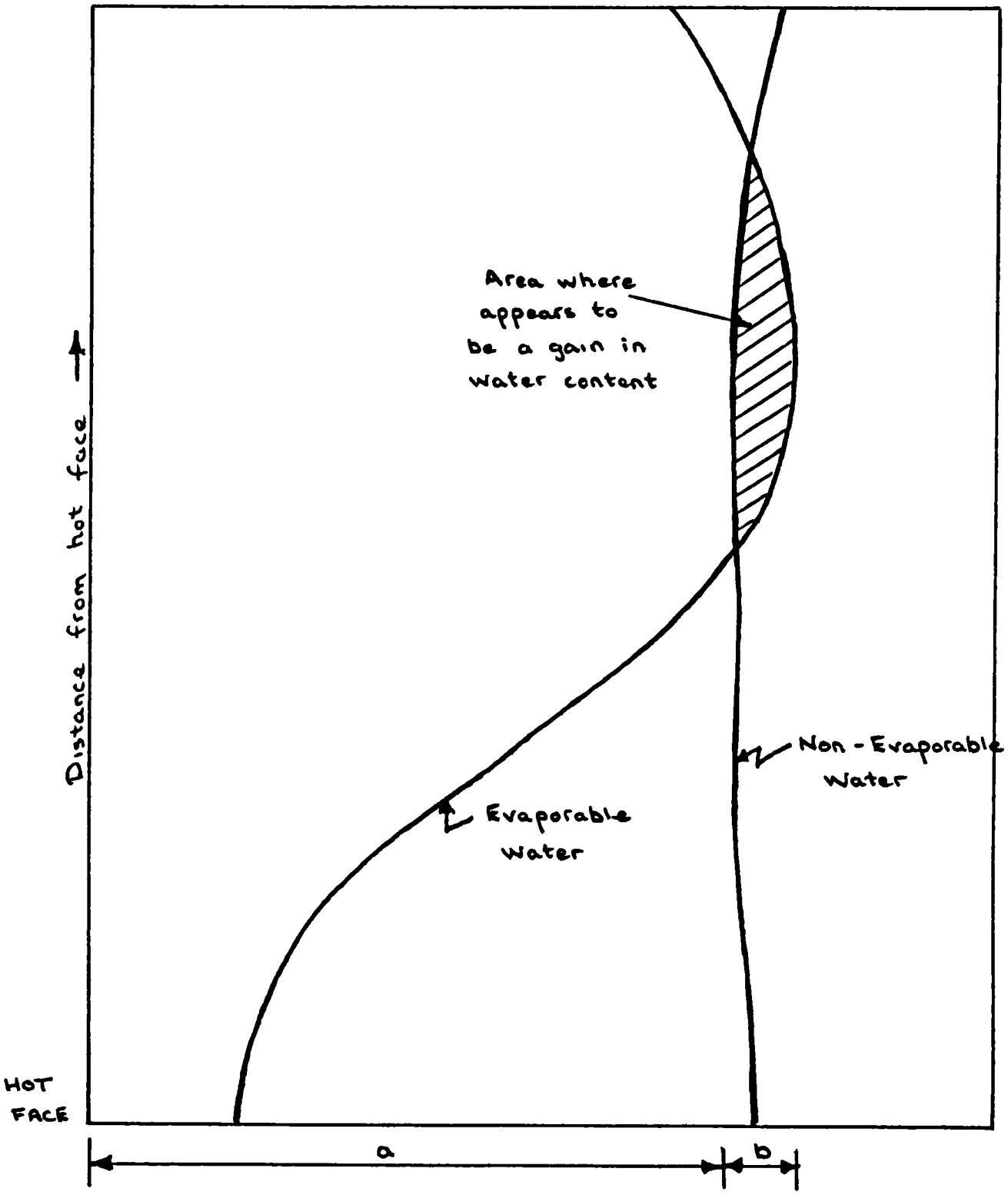
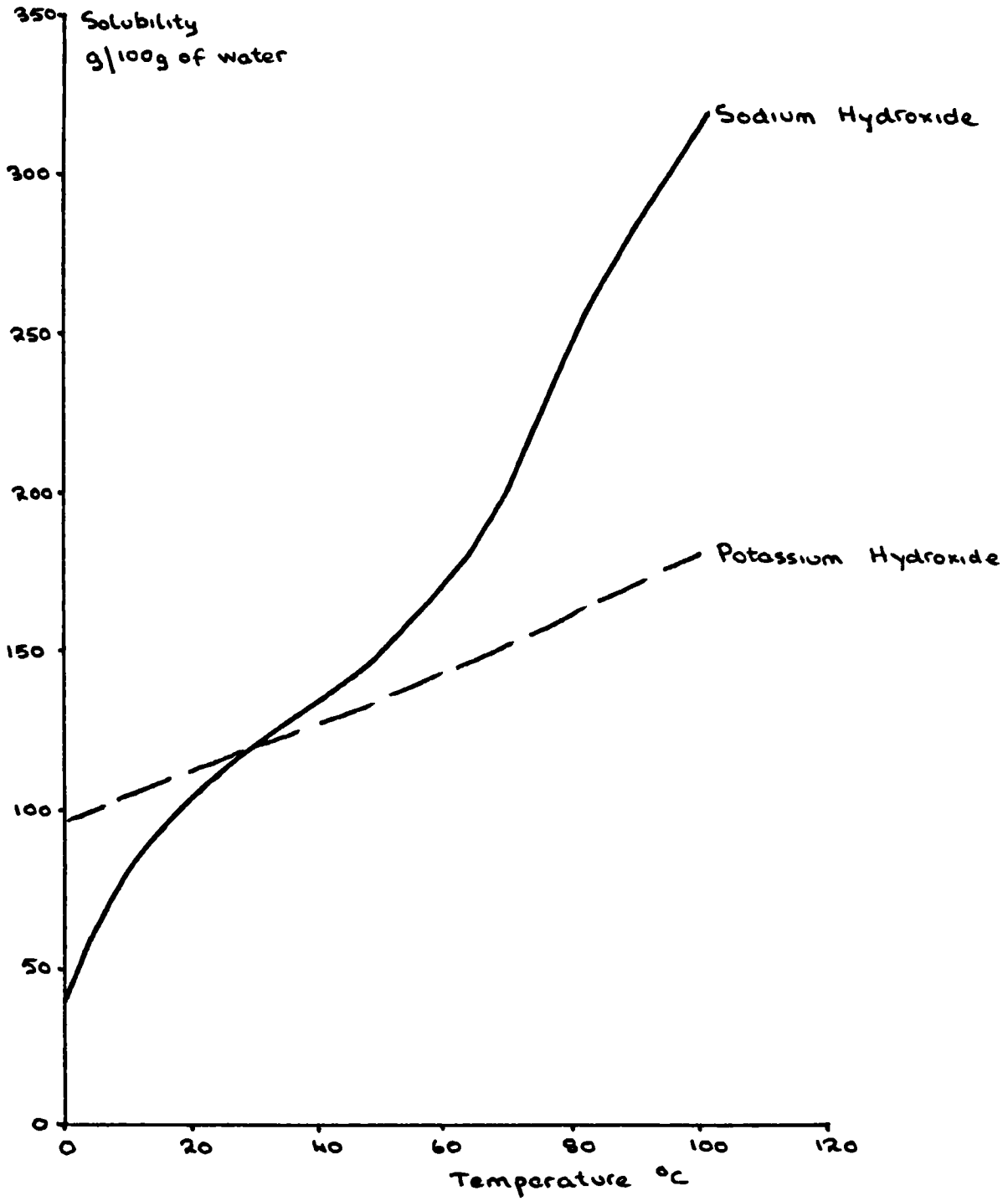


Fig 5:15 - General Diagrammatic form of the final water distributions for the Migration Series test specimens.



Ratio a/b is measure of $(V_l/V_g)_i$.

Fig 5 : 16 - Relationship between the solubility of Potassium Hydroxide and Sodium Hydroxide with temperature (91)



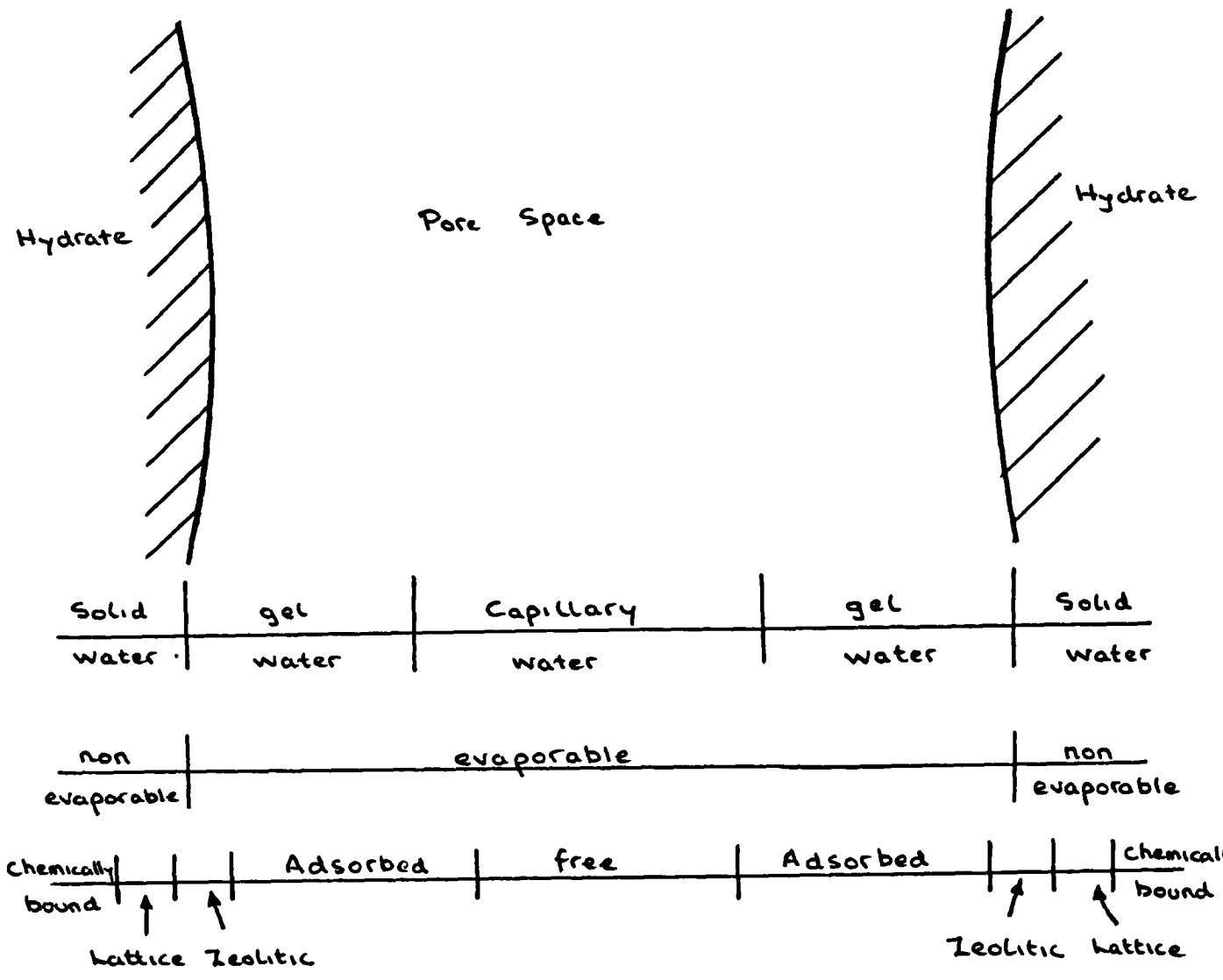
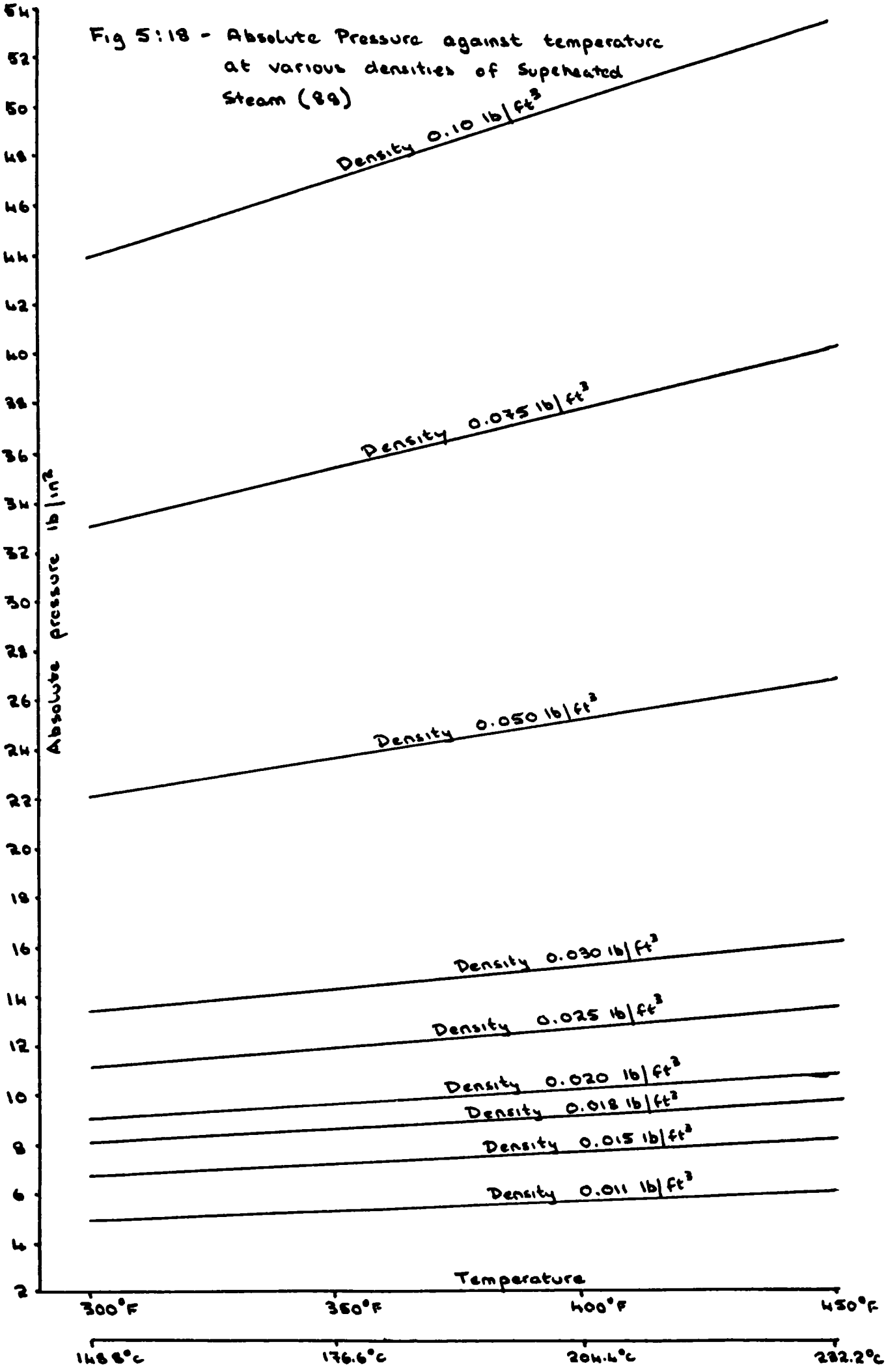


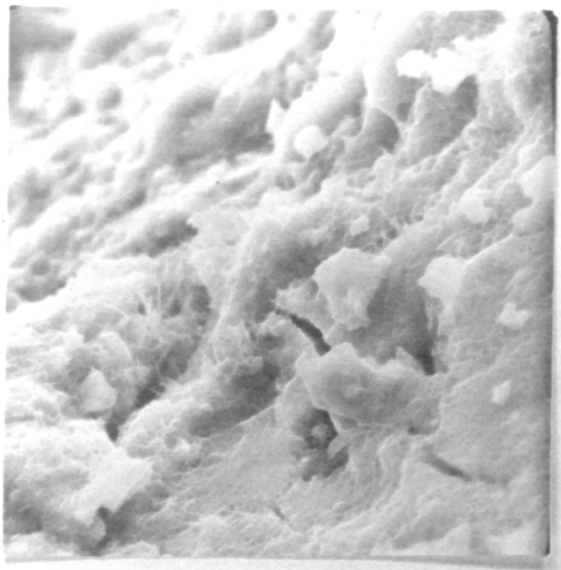
Fig 5:17 - Diagram showing various arbitrary states of water found in concrete.

Fig 5:18 - Absolute Pressure against temperature at various densities of Superheated Steam (89)



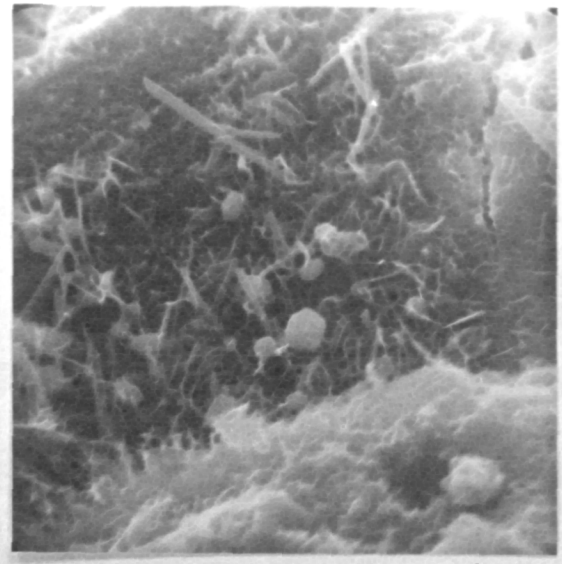
RELEASE TEST DUMMY SPECIMEN.

PLATE V - 1



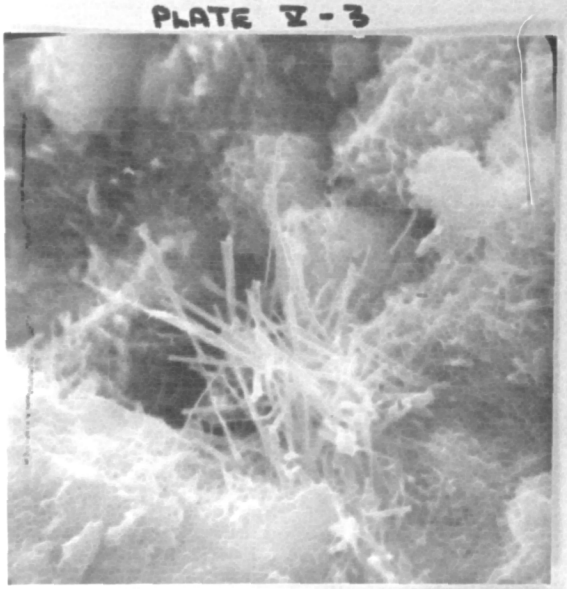
Magnification 2.09K 5μm

PLATE V - 2



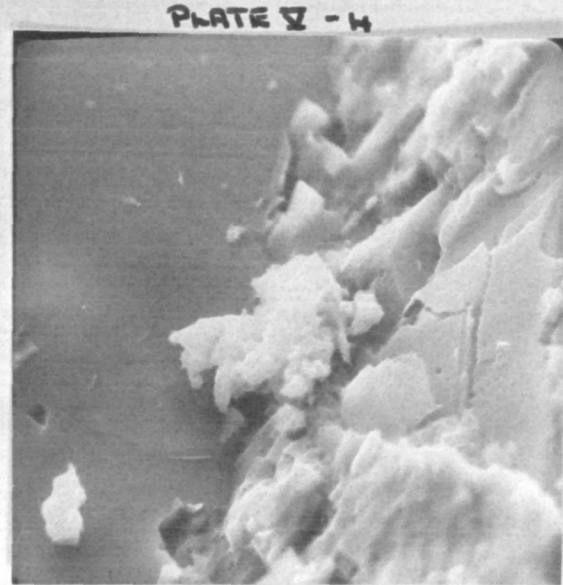
Magnification 5.32K 1μm

PLATE V - 3



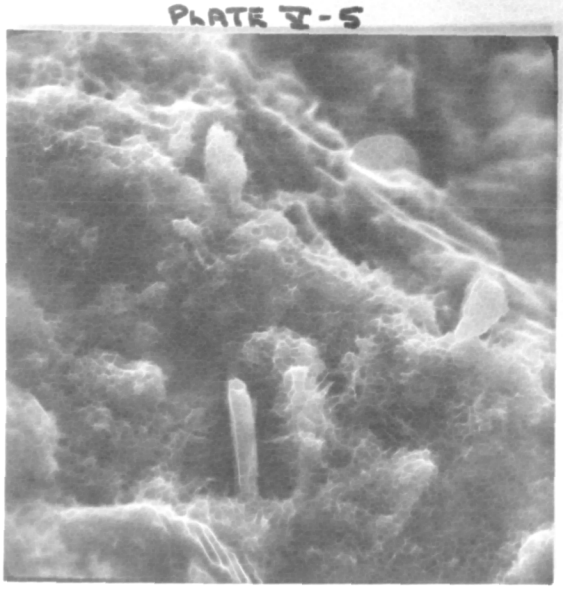
Magnification 0.544K 20μm

PLATE V - 4



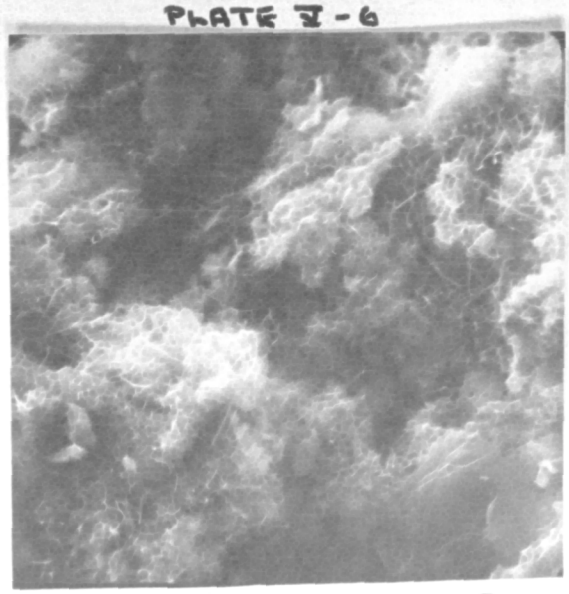
Magnification 2.41K 5μm

PLATE V - 5



Magnification 2.13K 5μm

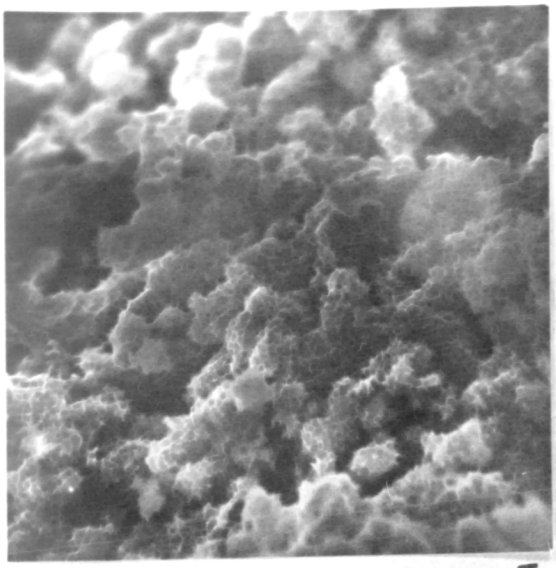
PLATE V - 6



Magnification 2.22K 5μm

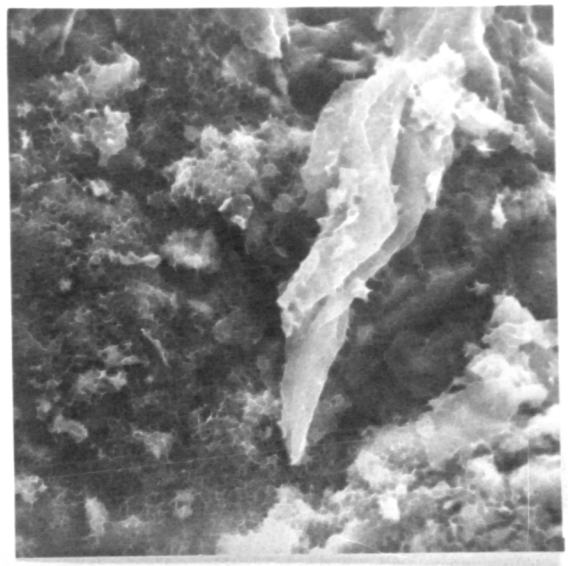
105°C RELEASE TEST SPECIMEN

PLATE V - 7



Magnification 2.20K 5μm

PLATE V - 8



Magnification 2.09 K 5μm

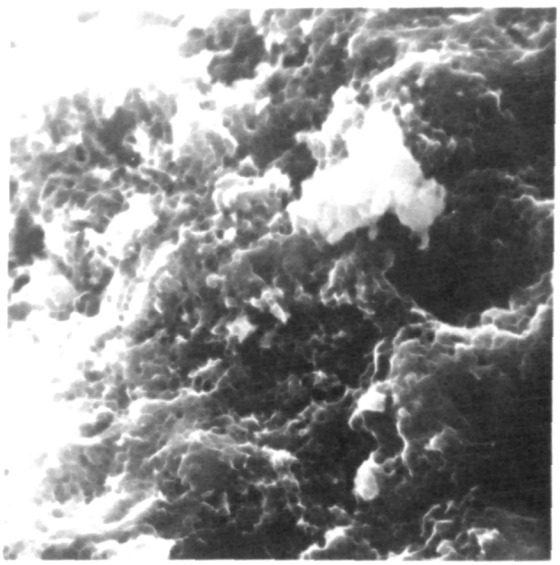
PLATE V - 9

Magnification 5.16K 1μm

PLATE V - 10

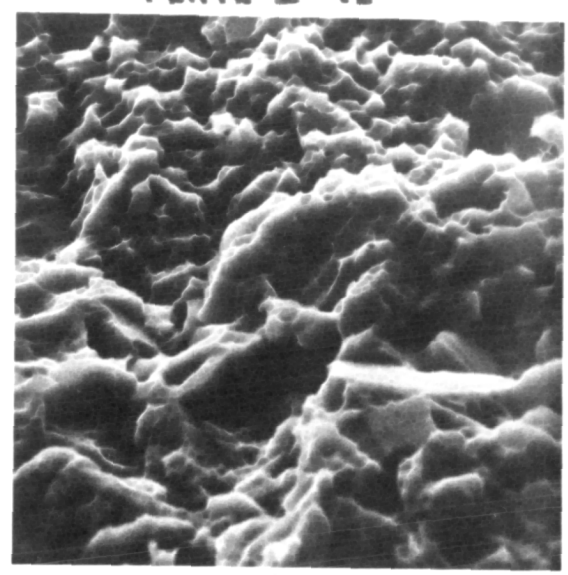
Magnification 2.08K 5μm

PLATE V - 11



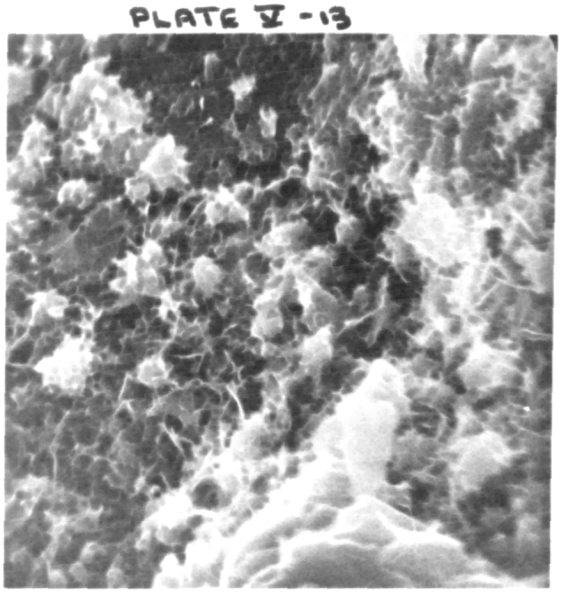
Magnification 11.2K 1μm

PLATE V - 12



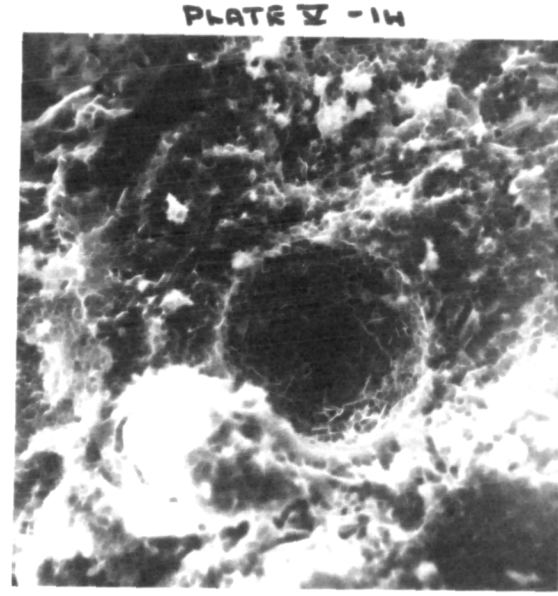
Magnification 1.98K 5μm

PLATE V - 13



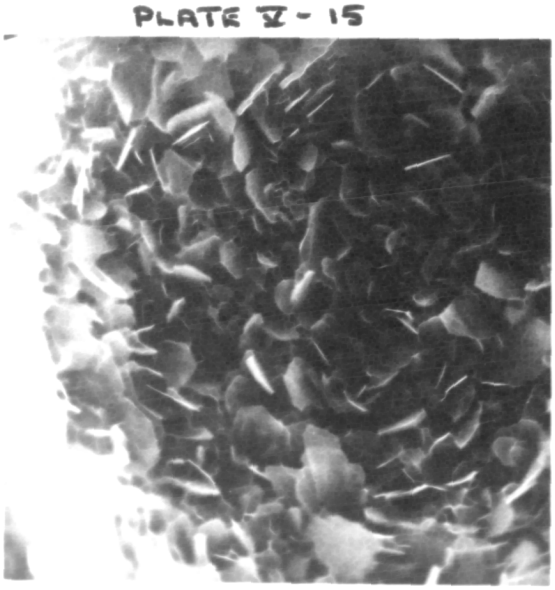
Magnification 7.87K 1μm

PLATE V - 14



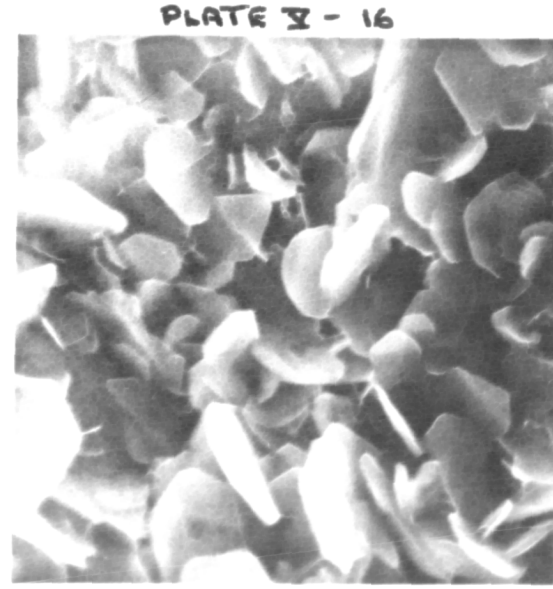
Magnification 0.625K 20μm

PLATE V - 15



Magnification 1.98K 5μm

PLATE V - 16



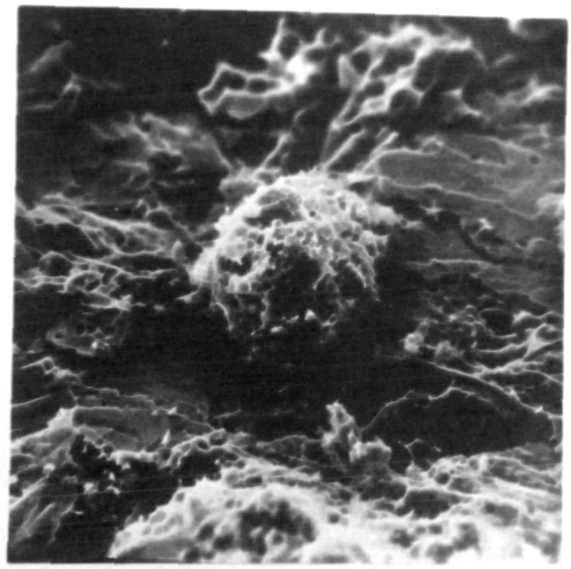
Magnification 6.25K 1μm

175° C RELEASE TEST SPECIMEN

PLATE V - 17

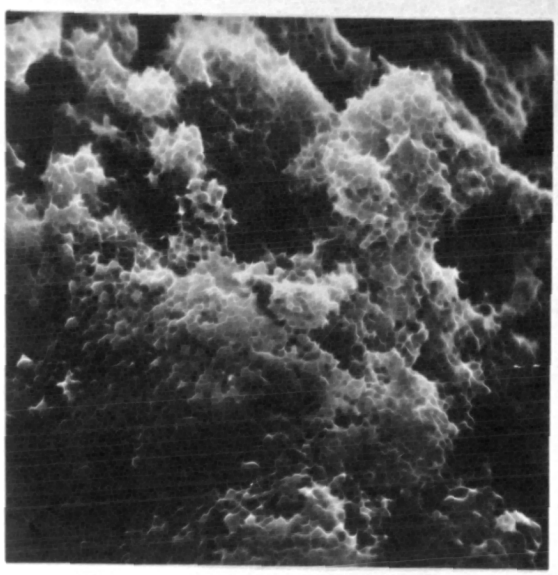
Magnification 2.09K 5μm

PLATE V - 18



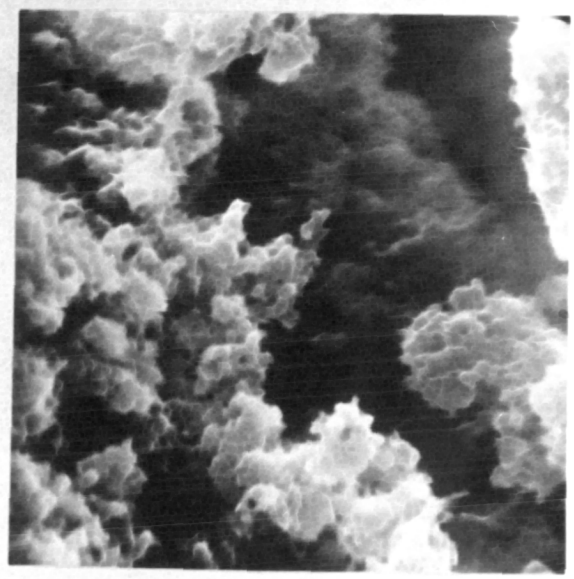
Magnification 0.528K 20μm

PLATE V - 19



Magnification 4.87K 1μm

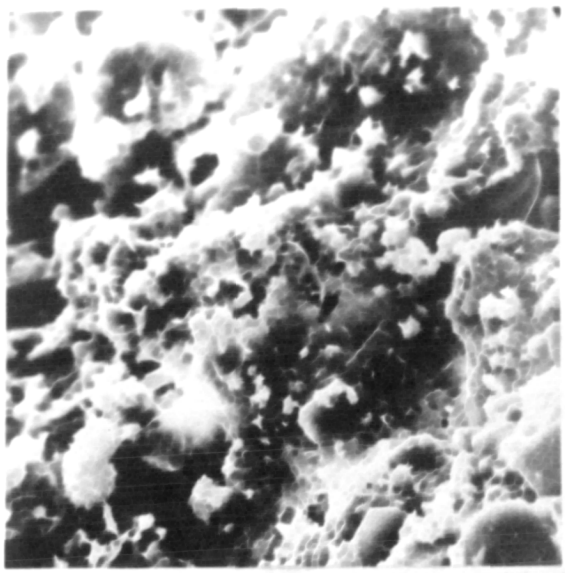
PLATE V - 20



Magnification 9.82K 1μm

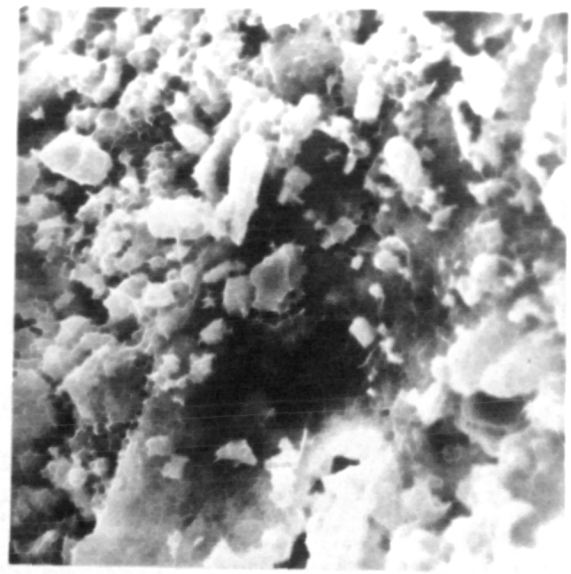
200°C HEATED SPECIMEN

PLATE V -21



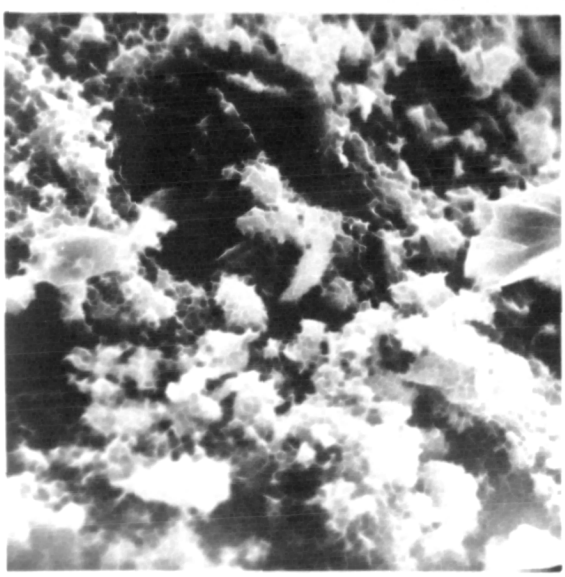
Magnification 0.978K 10μm

PLATE V - 22



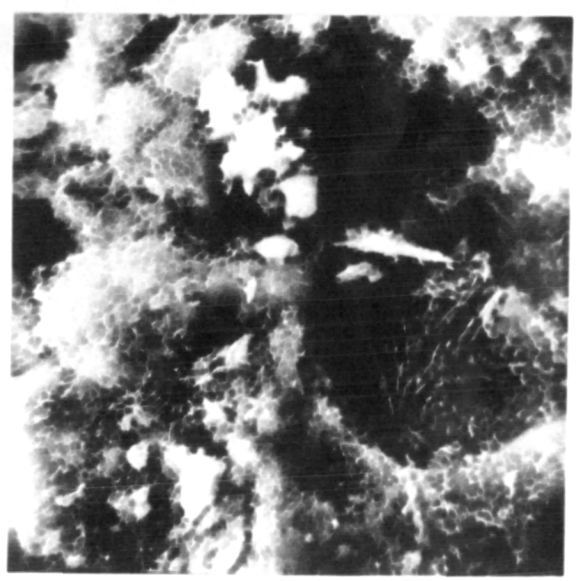
Magnification 1.88K 5μm

PLATE V - 23



Magnification 2.40K 5μm

PLATE V -24



Magnification 2.38K 5μm

APPENDIX I - RESULTS OF RELEASE TEST SPECIMENS.

FIGURES FOR APPENDIX I.

Figure API:1 – Graph of Gauge Pressure against temperature for Specimen No. 7 on heating to 150°C.

Figure API:2 – Graph of Gauge Pressure against weight of water remaining in specimen for specimen No. 7 tested at 150°C.

Figure API:3 – Graph of Gauge Pressure against temperature for Specimen No. 8 on heating to 105°C.

Figure API:4 – Graph of Gauge Pressure against weight of water remaining in specimen for Specimen No. 8 tested at 105°C.

Figure API:5 – Graph of Gauge Pressure against temperature for specimen No. 10 on heating to 125°C.

Figure API:6 – Graph of Gauge Pressure against weight of water remaining in specimen for Specimen No. 10 tested at 125°C.

Figure API·7 – Graph of Gauge Pressure against temperature for Specimen No. 11 on heating to 150°C.

Figure API:8 – Graph of Gauge Pressure against weight of water remaining in specimen for Specimen No. 11 tested at 150°C.

Figure API·9 – Graph of Gauge Pressure against temperature for Specimen No. 12 on heating to 105°C.

Figure API:10 – Graph of Gauge Pressure against weight of water remaining in specimen for specimen no. 12 tested at 105°C.

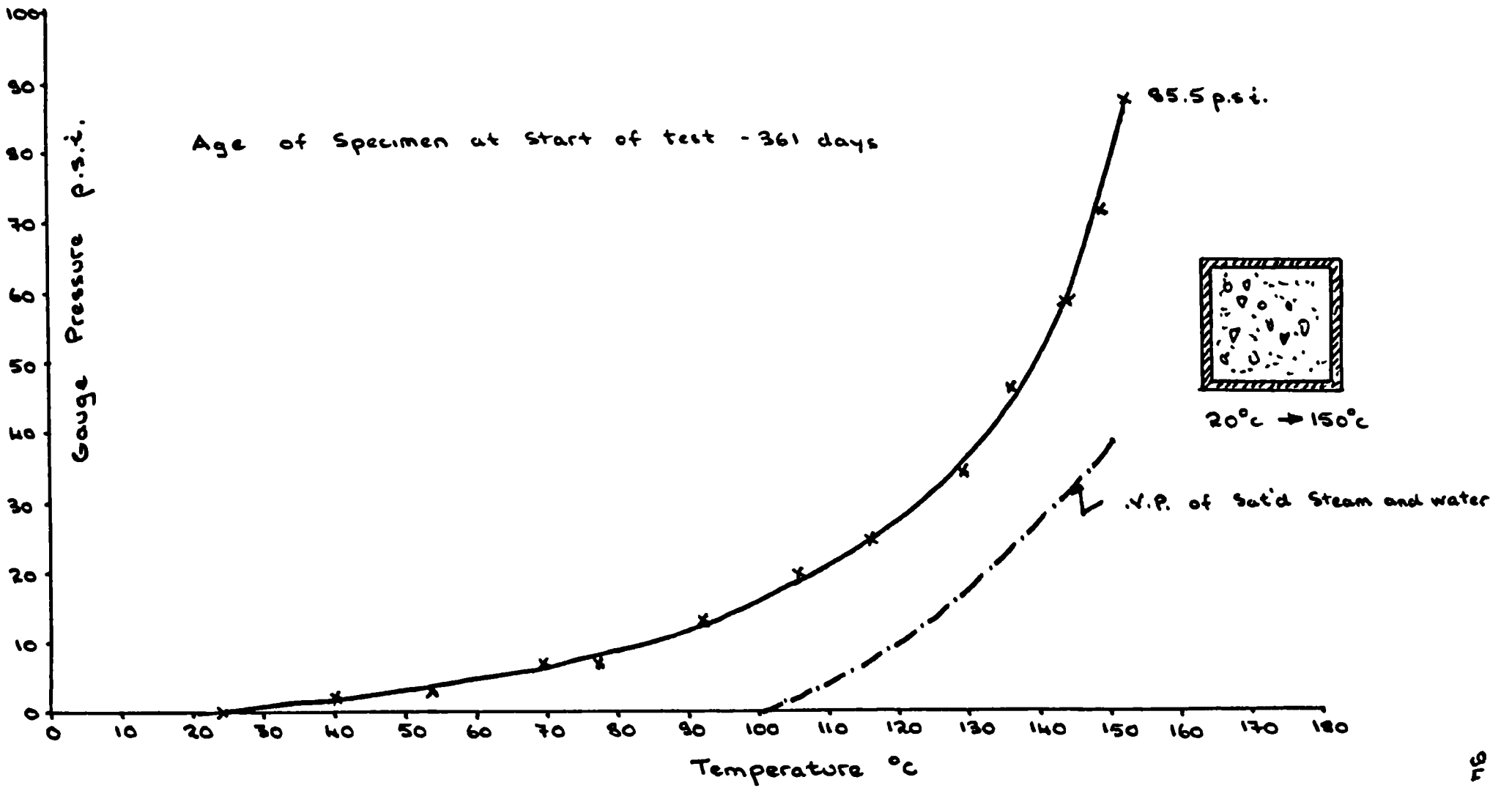
Figure API:11 – Graph of Gauge Pressure against temperature for specimen No. 15 on heating to 105°C.

Figure API:12 – Graph of Gauge Pressure against weight of water remaining in specimen for specimen No. 15 tested at 105°C.

Figure API:13 – Graph of Gauge Pressure against temperature for specimen No. 16 on heating to 125°C.

Figure API:14 – Graph of Gauge Pressure against weight of water remaining in specimen for Specimen No. 16 tested at 125°C.

Fig API - 1 - Graph of Gauge Pressure against temperature for Specimen N° 7 on heating to 150°c.



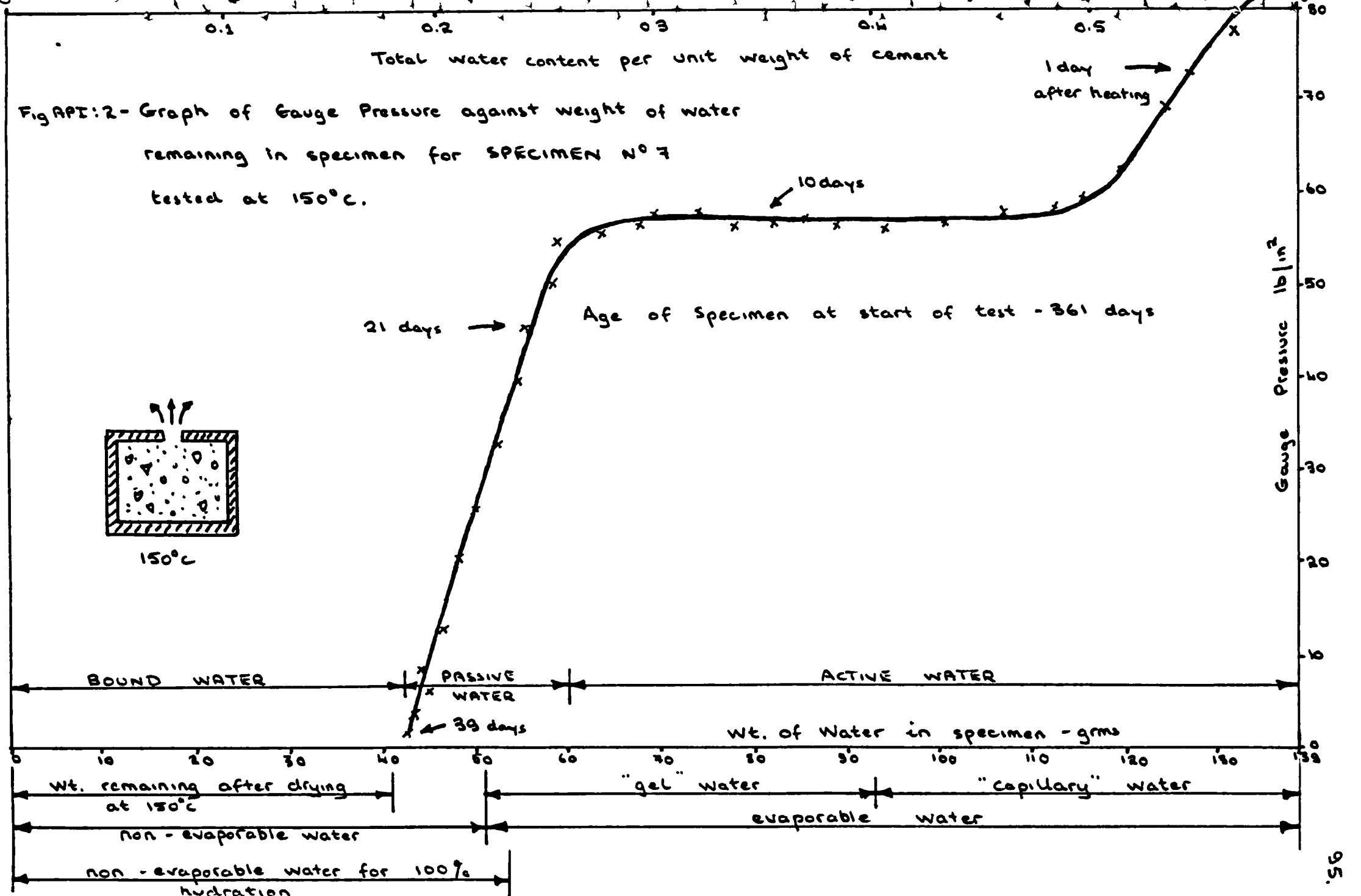
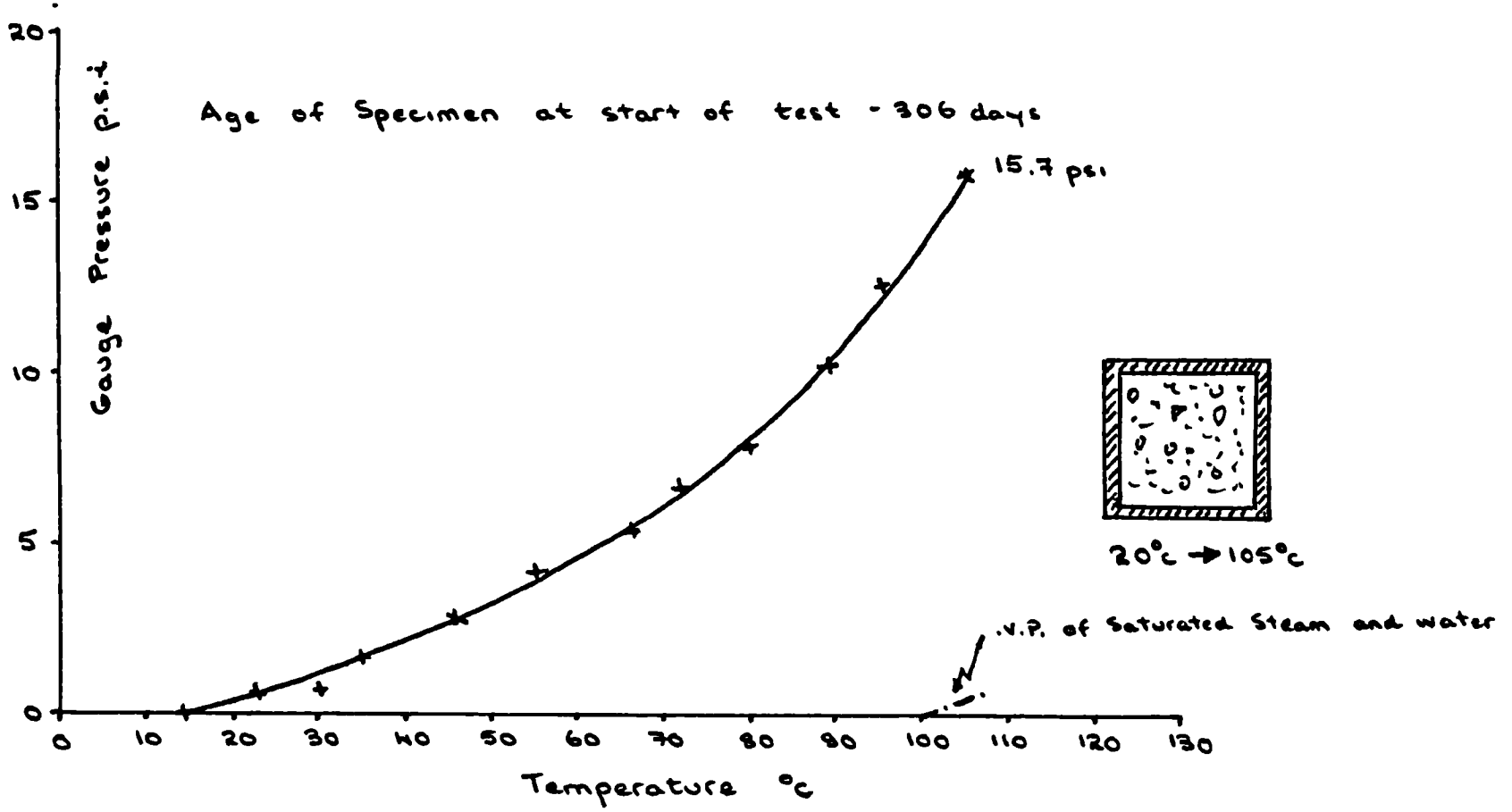


Fig APT:2 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 7 tested at 150°C.

Fig API:3- Graph of Gauge Pressure against temperature for Specimen N° 8 on heating to 105°c.



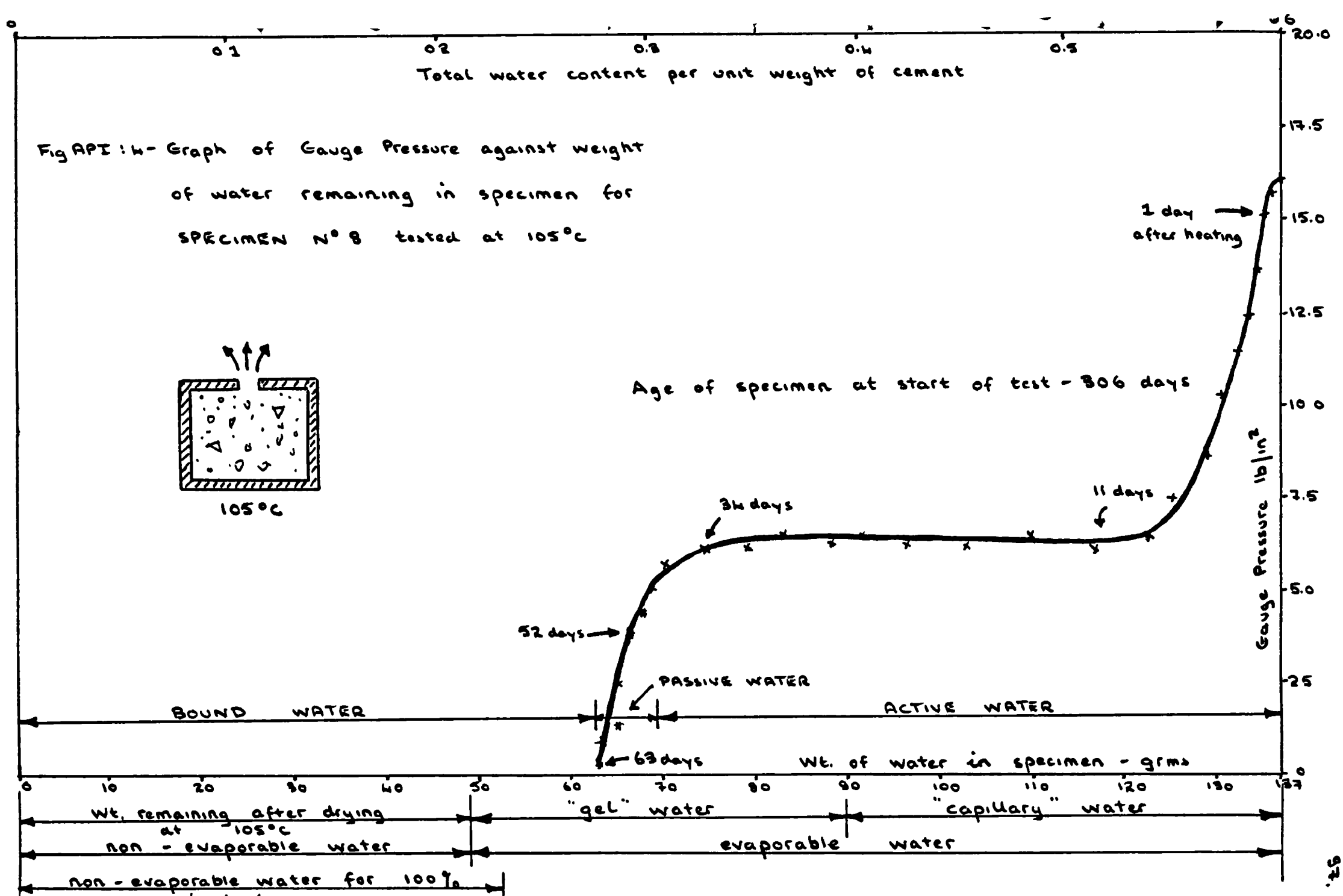
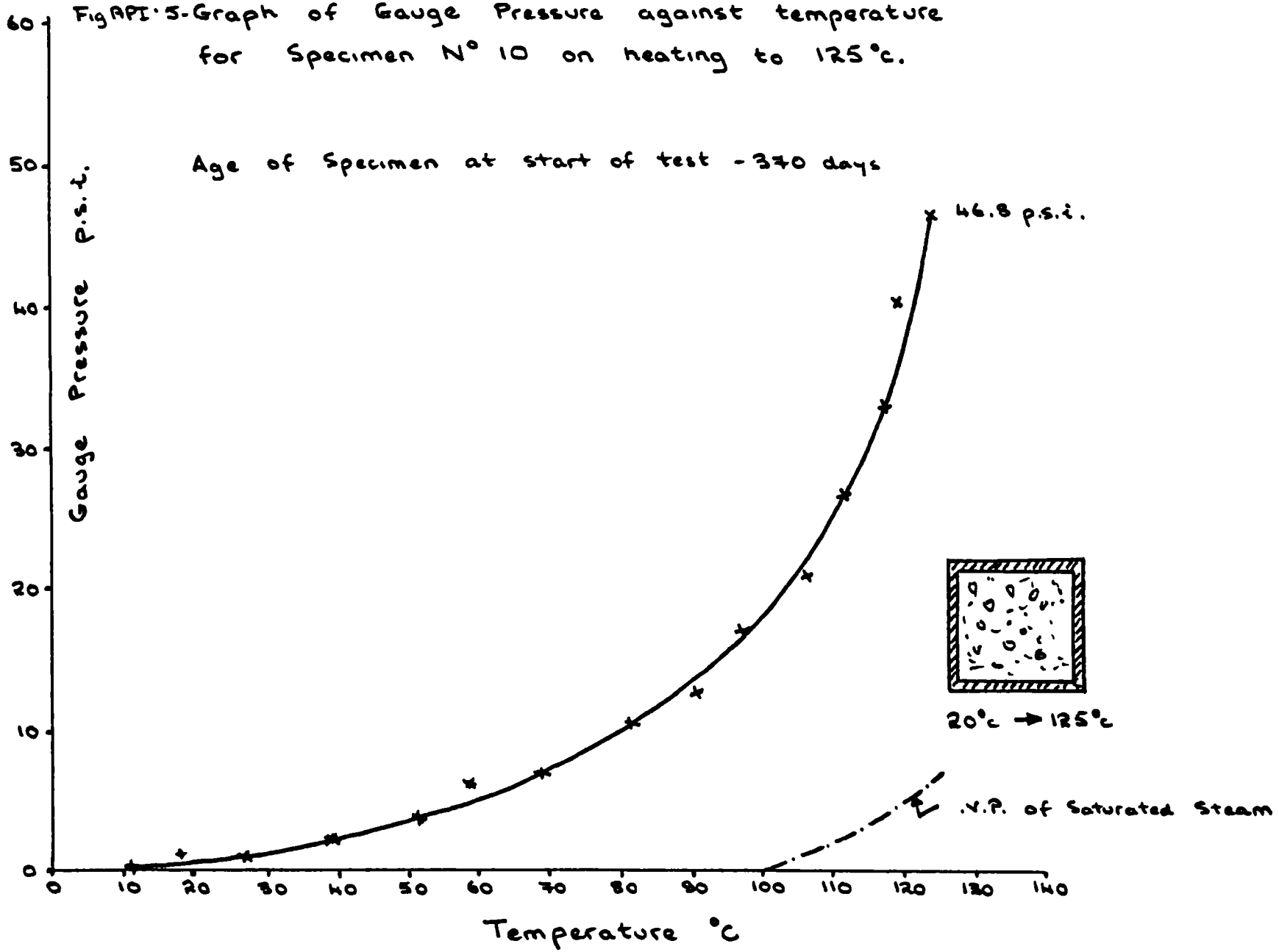


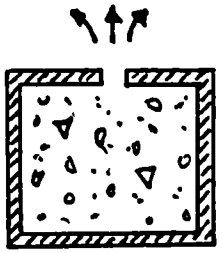
Fig API : 4 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 8 tested at 105°C

Fig API·5-Graph of Gauge Pressure against temperature for Specimen N° 10 on heating to 125°c.



Total water content per unit weight of cement

Fig API-6 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 10 tested at 125°c



5 days after heating

20 days

35 days

55 days

Age of Specimen at start of test - 370 days

Gauge Pressure lb/in²

40
35
30
25
20
15
10
5

BOUND WATER | PASSIVE WATER | ACTIVE WATER

Wt. of water in specimen - grms

0 10 20 30 40 50 60 70 80 90 100 110 120 130 138

Wt. remaining after drying at 125°C

"gel" water

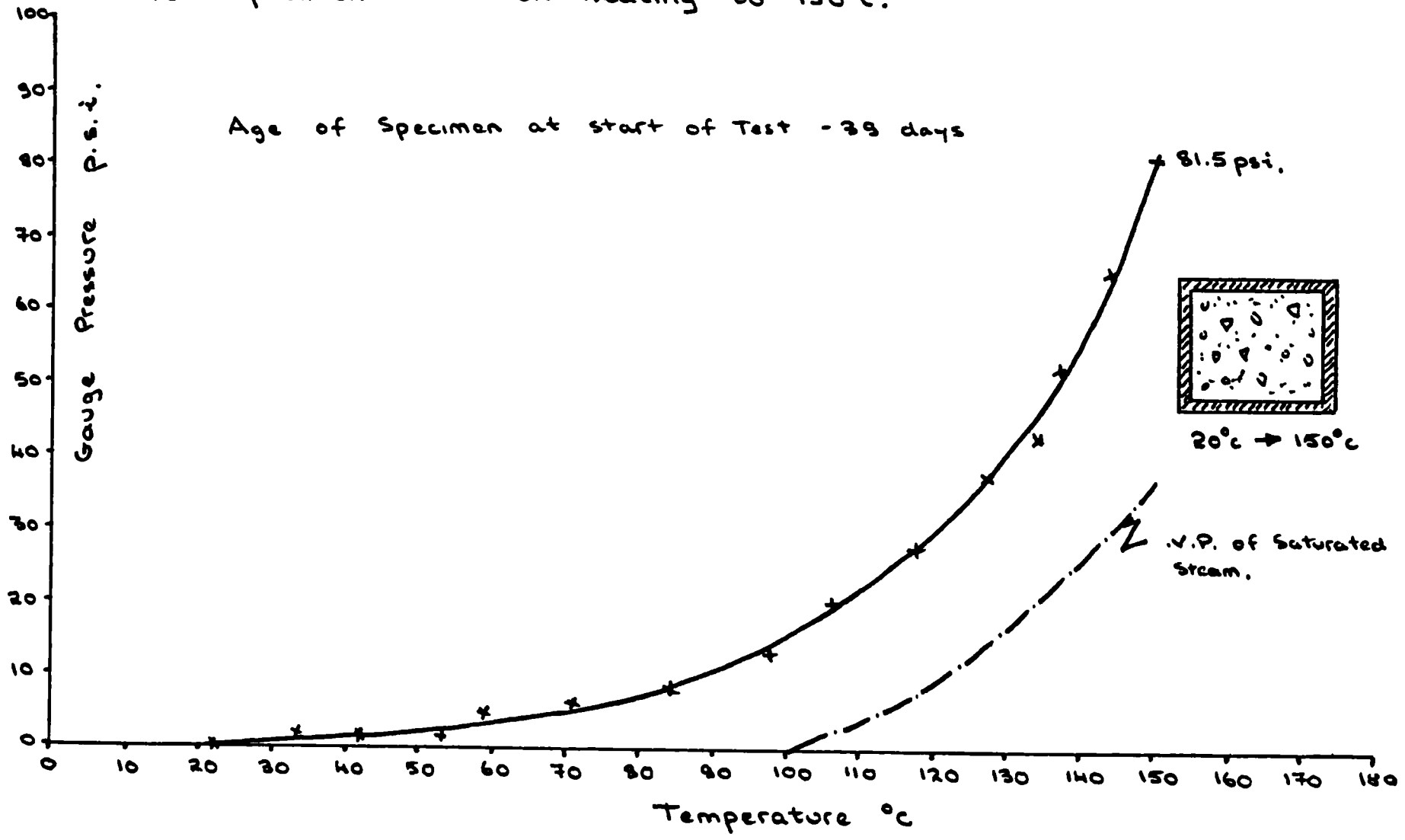
"capillary" water

non-evaporable water

evaporable water

non-evaporable water for 100% hydration

Fig API:7- Graph of Gauge Pressure against temperature for Specimen N° 11 on heating to 150°c.



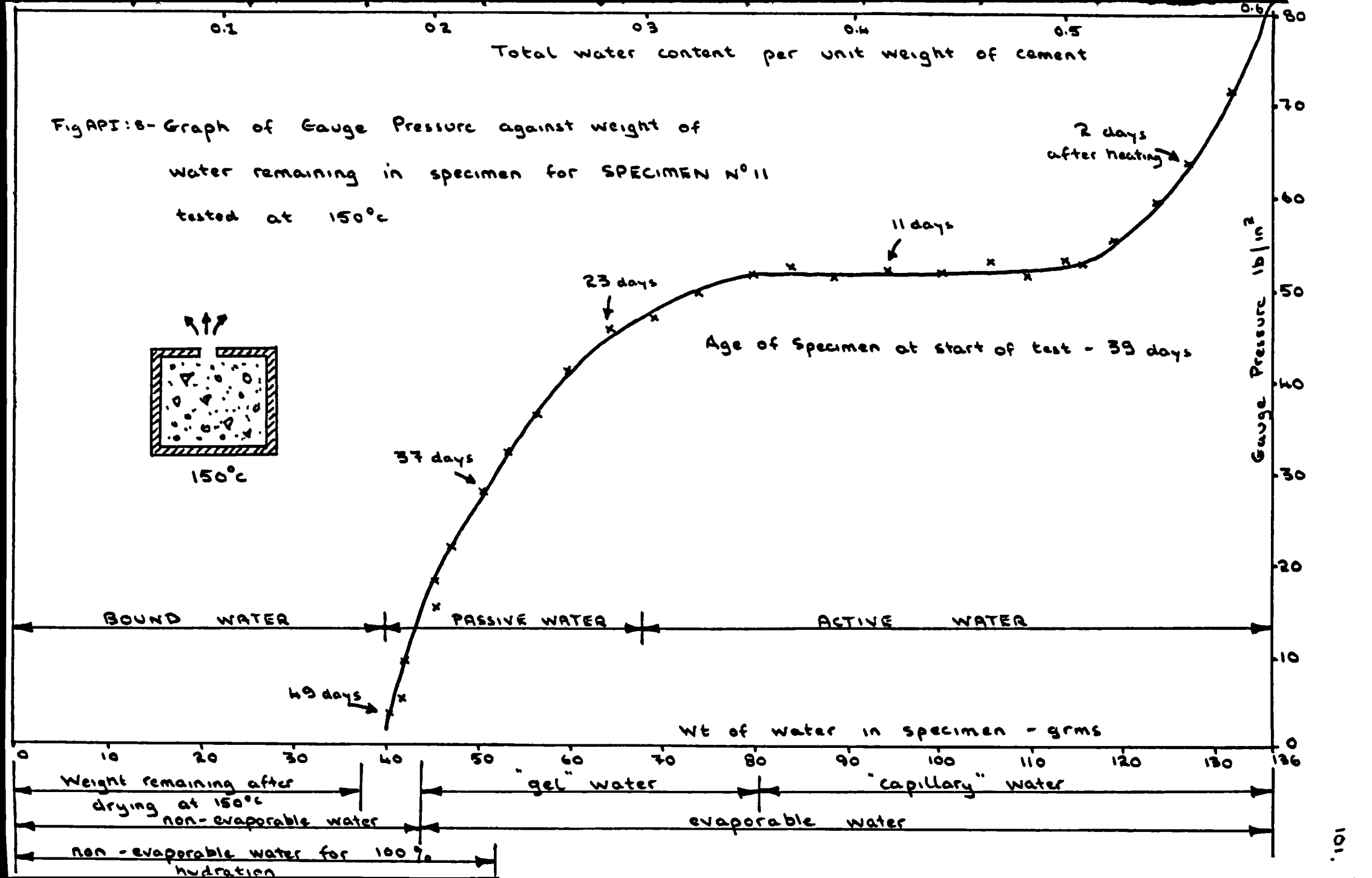
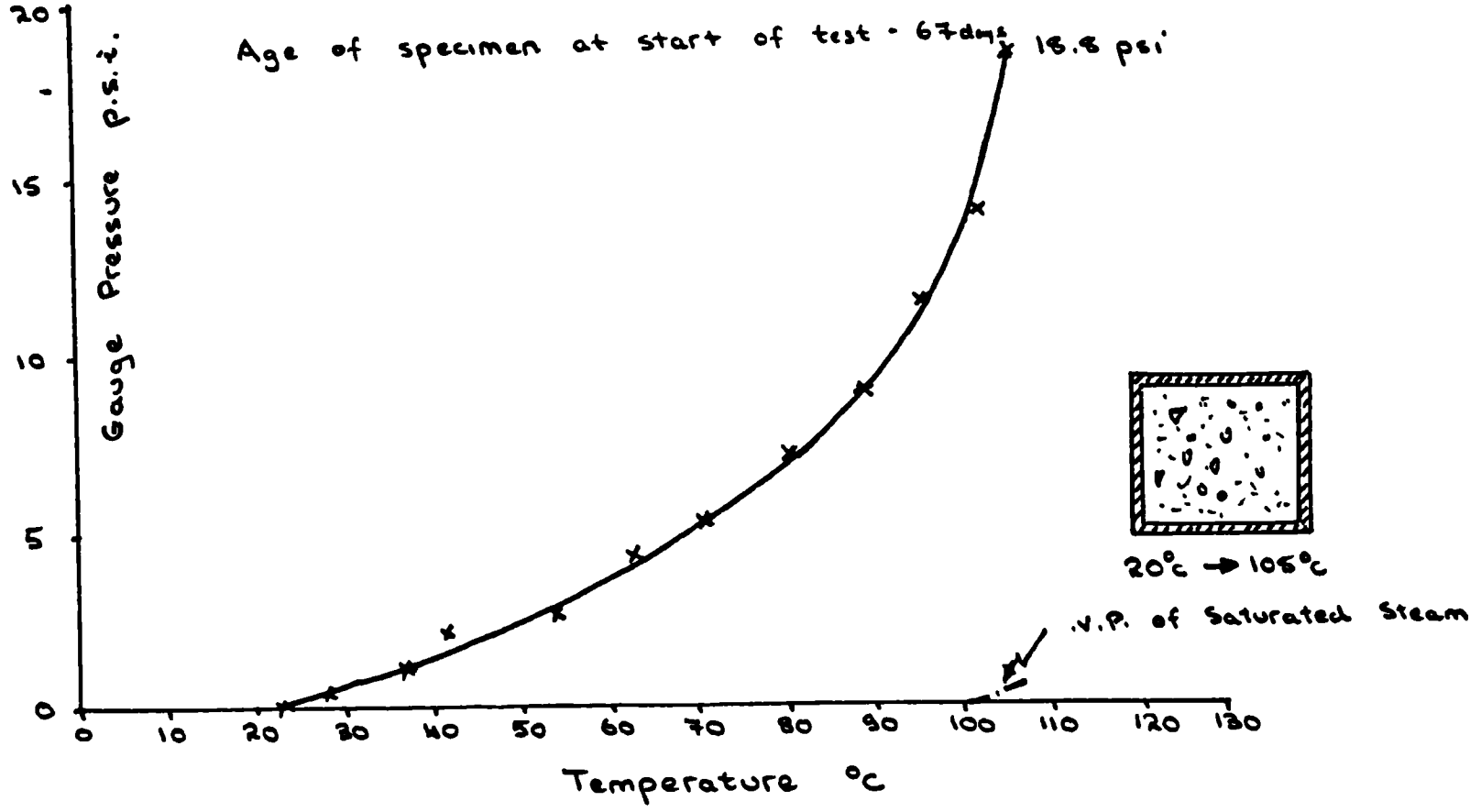


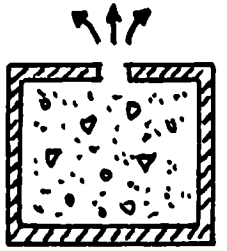
Fig API:8- Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N°11 tested at 150°c

Fig API:9 - Graph of Gauge Pressure against temperature for Specimen N° 12 on heating to 105°C.



Total water content per unit weight of cement

Fig API:10 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 12 tested at 105°c



Age of specimen at start of test - 67 days

3 days after heating

12 days

33 days

Gauge Pressure lb/in²

17.5
15.0
12.5
10.0
7.5
5.0
2.5
0

Wt. of water in specimen - grms

0 10 20 30 40 50 60 70 80 90 100 110 120 130 133

Wt. remaining after drying at 105°c

"gel" water

"capillary" water

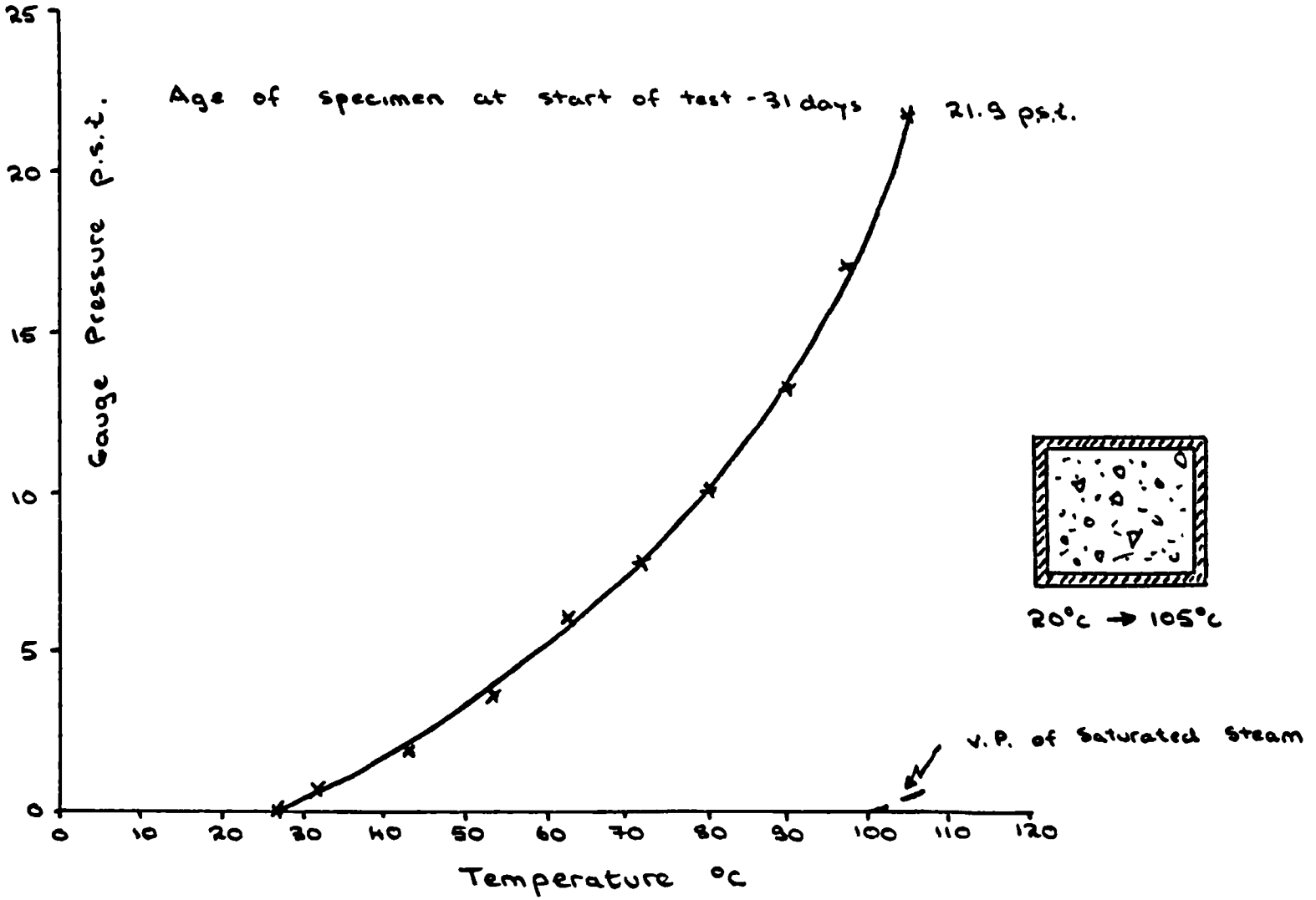
non - evaporable water

evaporable water

non - evaporable water for 100% hydration

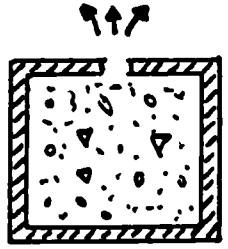
E01

Fig APT:11 - Graph of Gauge Pressure against temperature for Specimen N° 15 on heating to 105°c.



0.4
Total Water content per unit weight of cement

Fig API:12 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 15 tested at 105°C



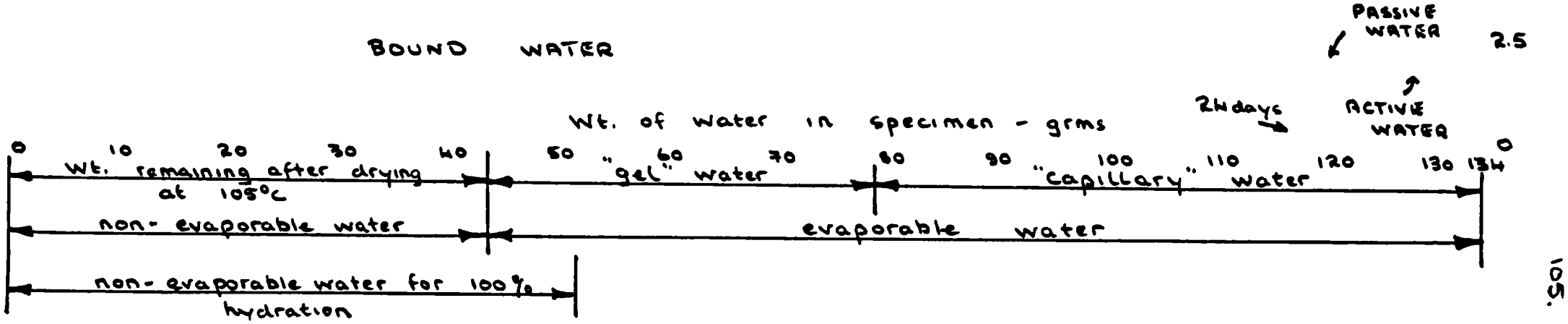
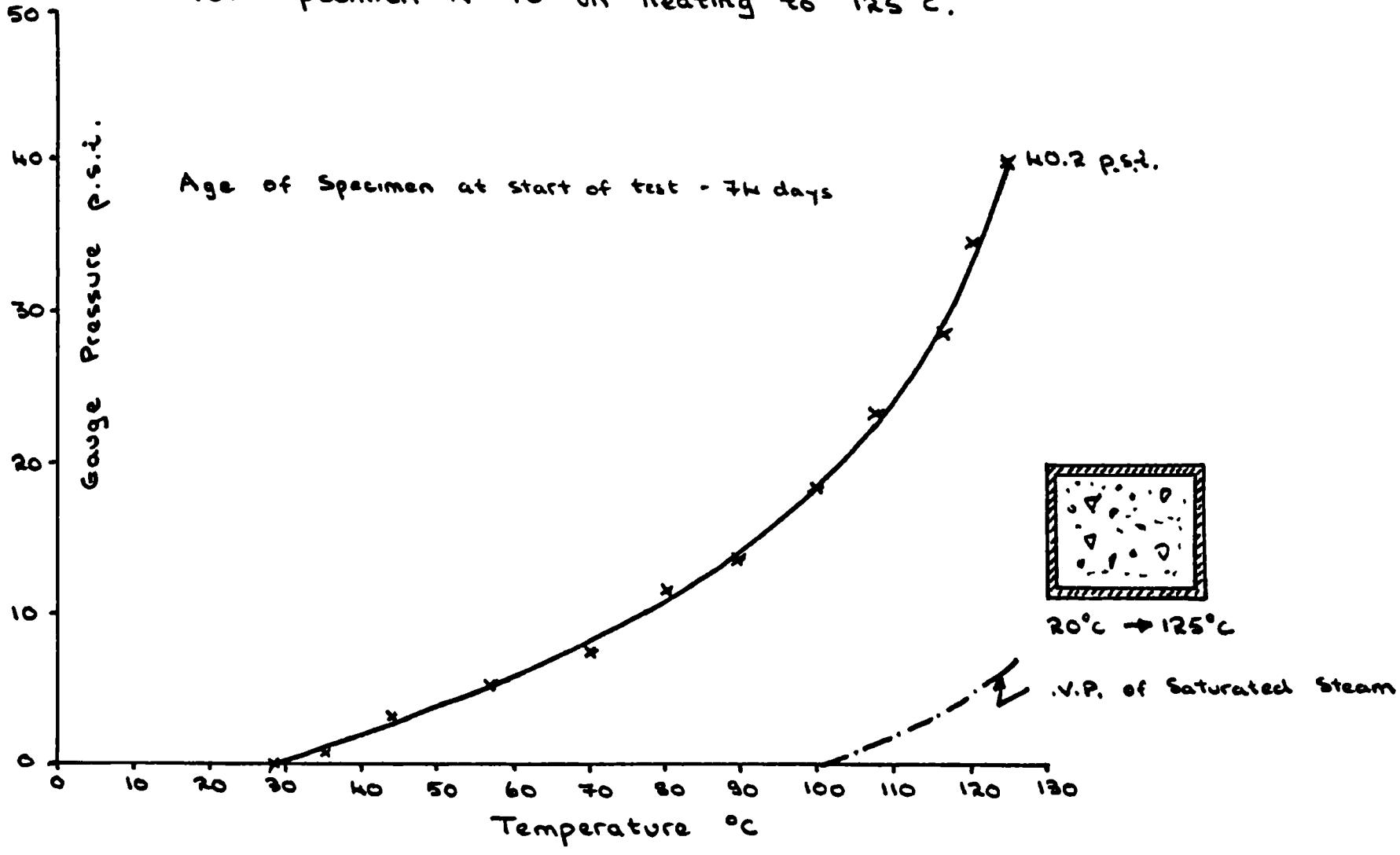


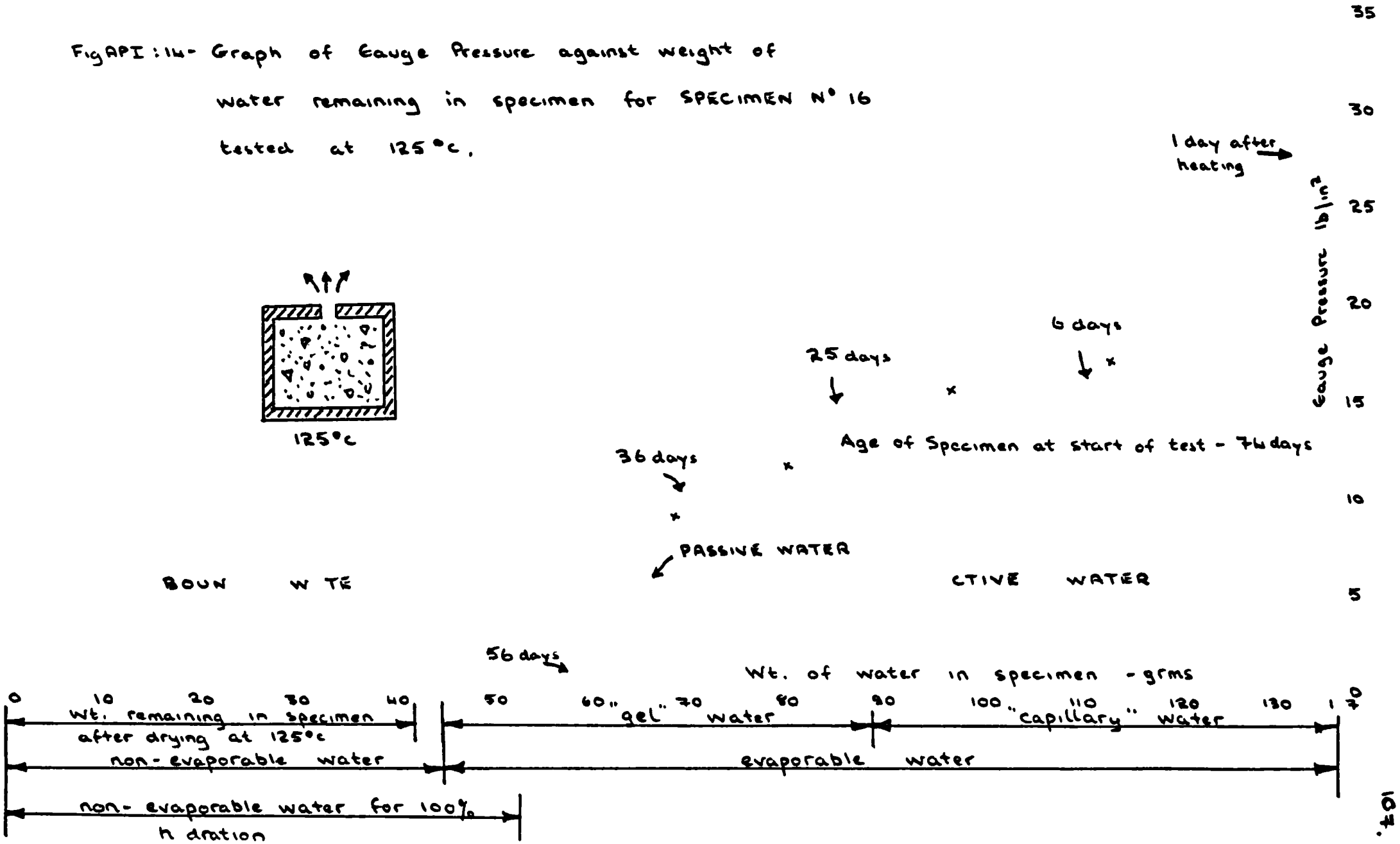
Fig API : 13 - Graph of Gauge Pressure against temperature for Specimen N° 16 on heating to 125°C.



.2 0.2 0.3 0.4 0.5

Total water content per unit weight of cement

Fig API : 14 - Graph of Gauge Pressure against weight of water remaining in specimen for SPECIMEN N° 16 tested at 125 °c.



CHAPTER SIX AND APPENDIX II.

FIGURES AND PHOTOGRAPHS.

FIGURES FOR CHAPTER SIX.

PHOTOGRAPHS FOR CHAPTER SIX.

Plate VI:3 - Section 12 from Specimen B2.

Plate VI:4 - Section 20 from Specimen B2.

Plate VI.5 - Section 31 from Specimen B2

Plate VI·6 - Section 43 from Specimen B2.

Figure 6:1 - Temperature distributions for 5ft Migration Series Specimens.

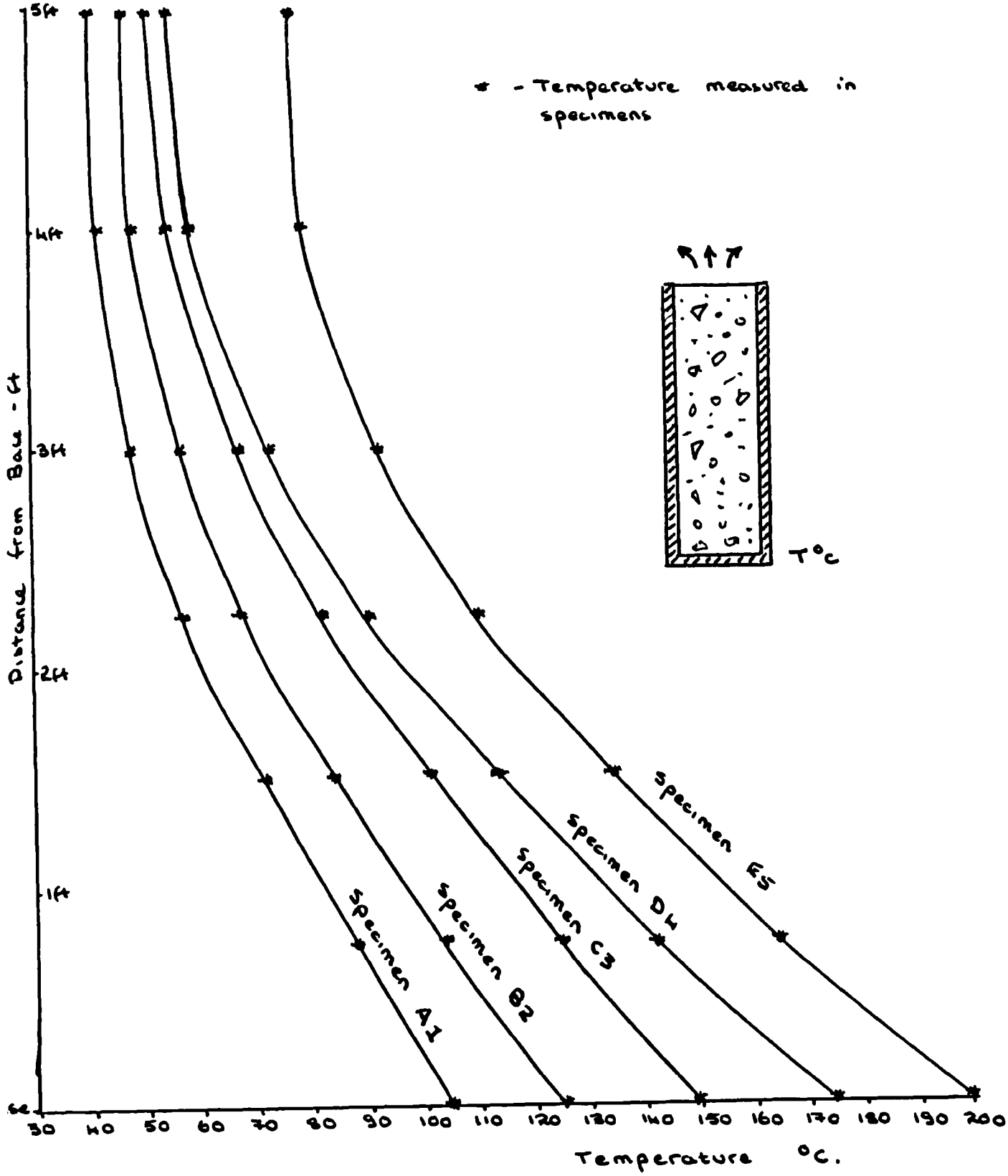
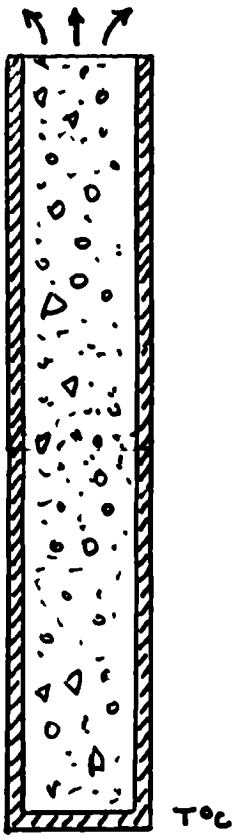


Figure 6:2 - Temperature distributions for 10ft Migration Series Specimens

* - Temperatures measured in specimens



Specimen S19
Specimen T20
Specimen P16
Specimen Q17
Specimen R18

Distance from Base - ft

10
9
8
7
6
5
4
3
2
1
Base

30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200

Temperature °C

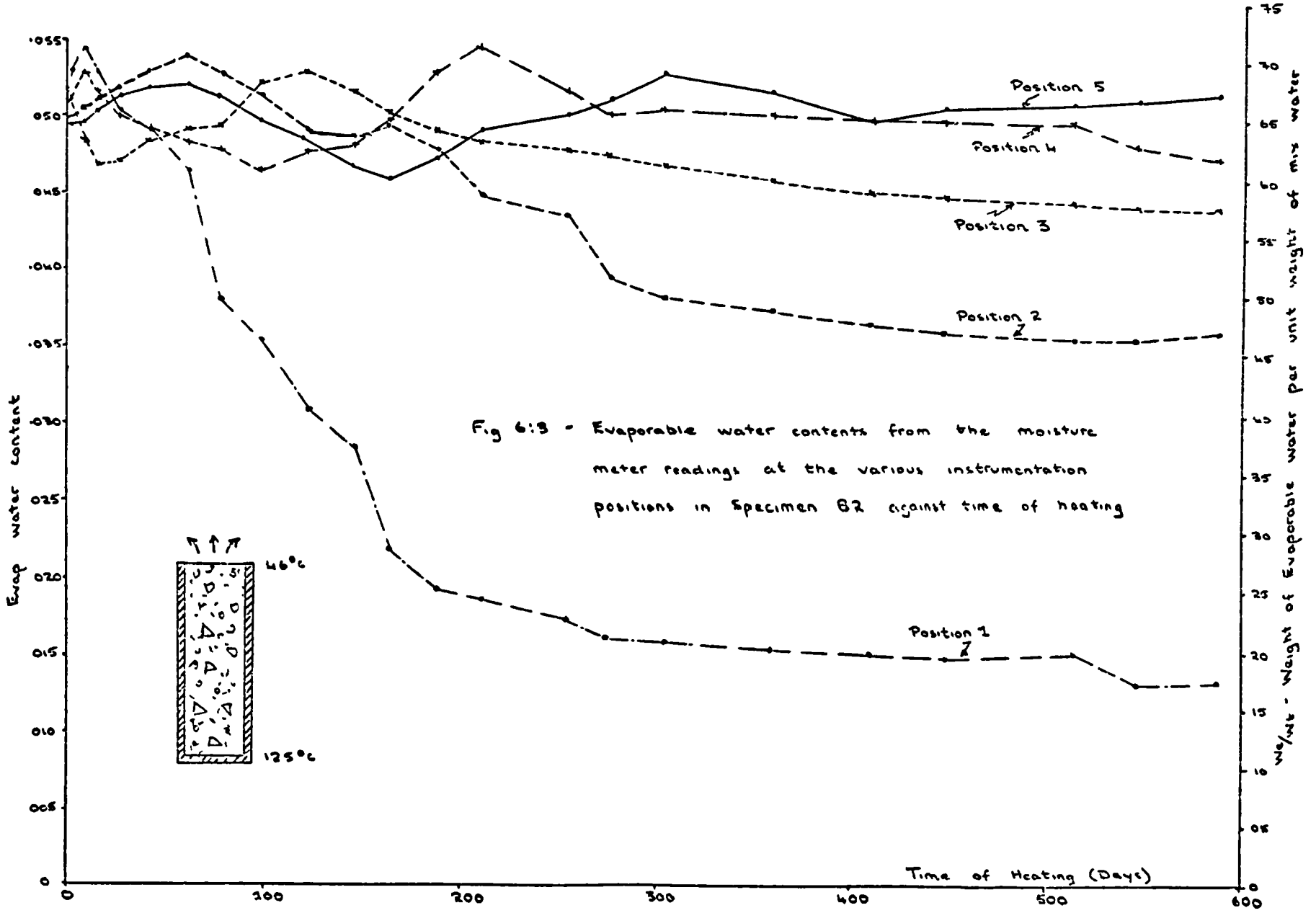


Fig 6:3 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen B2 against time of heating

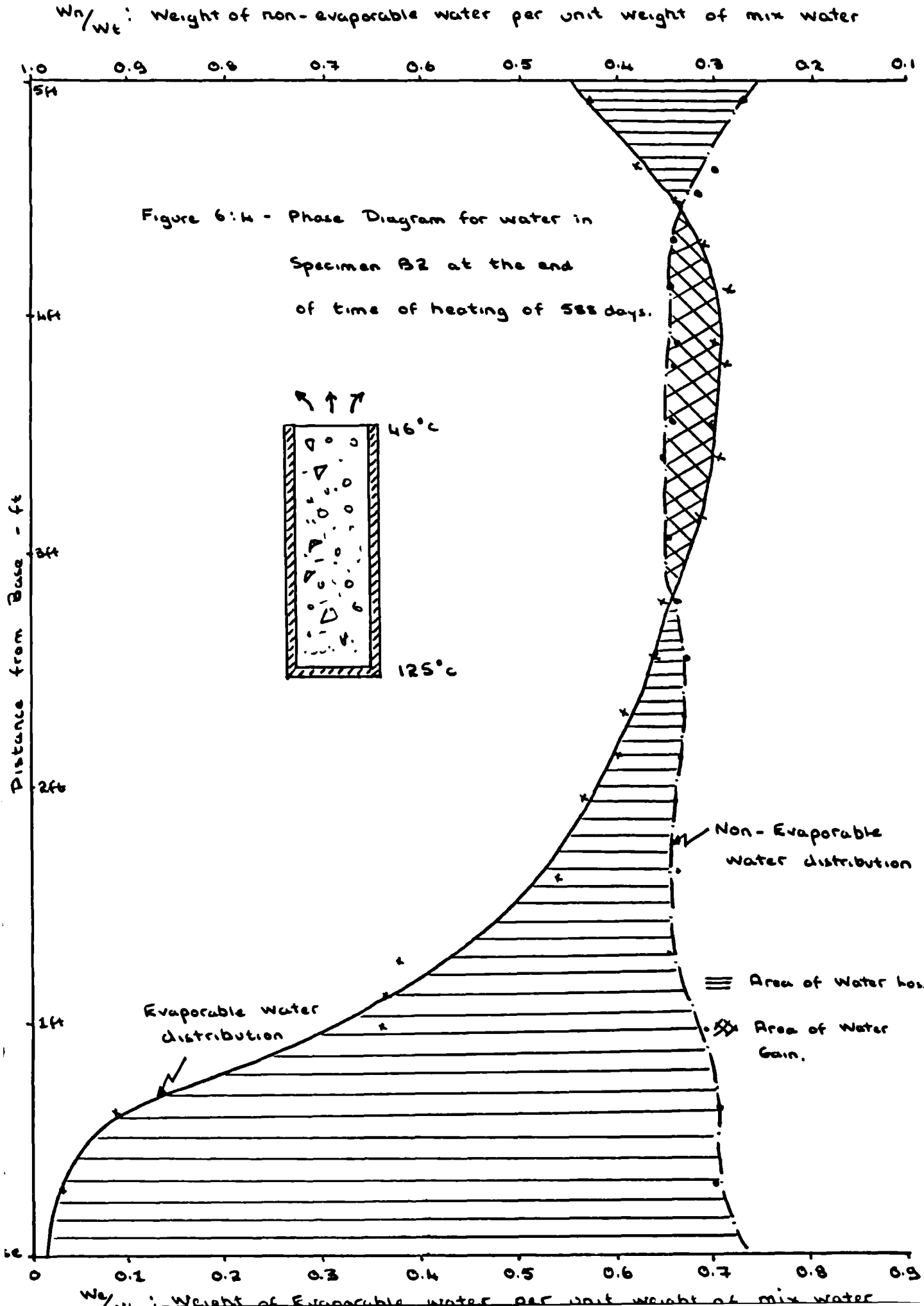
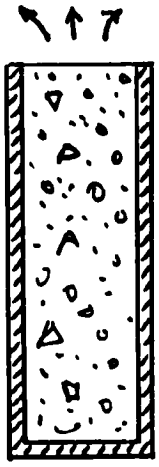


Figure 6:4 - Phase Diagram for water in Specimen B2 at the end of time of heating of 588 days.

Figure 6:5 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen B2



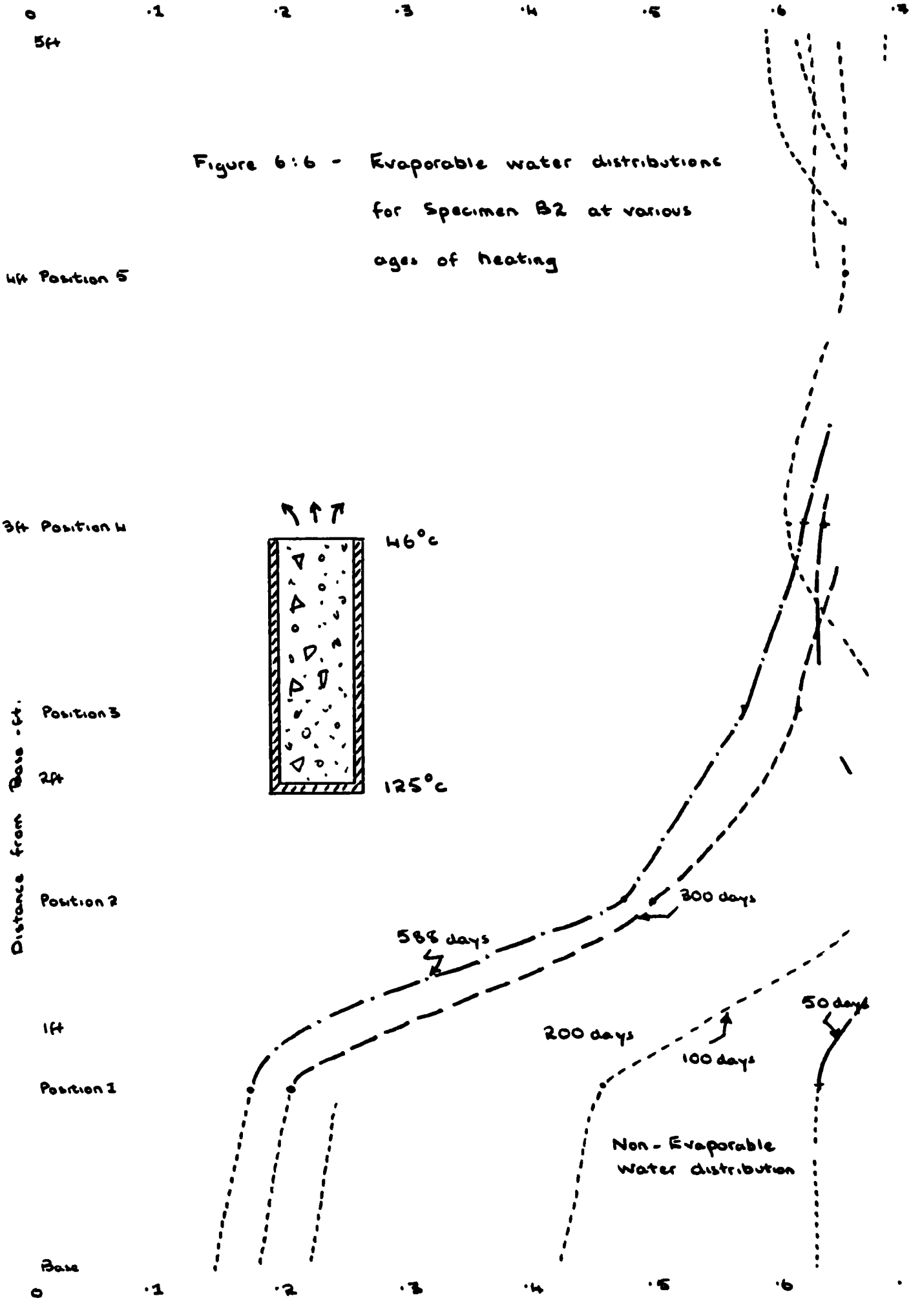
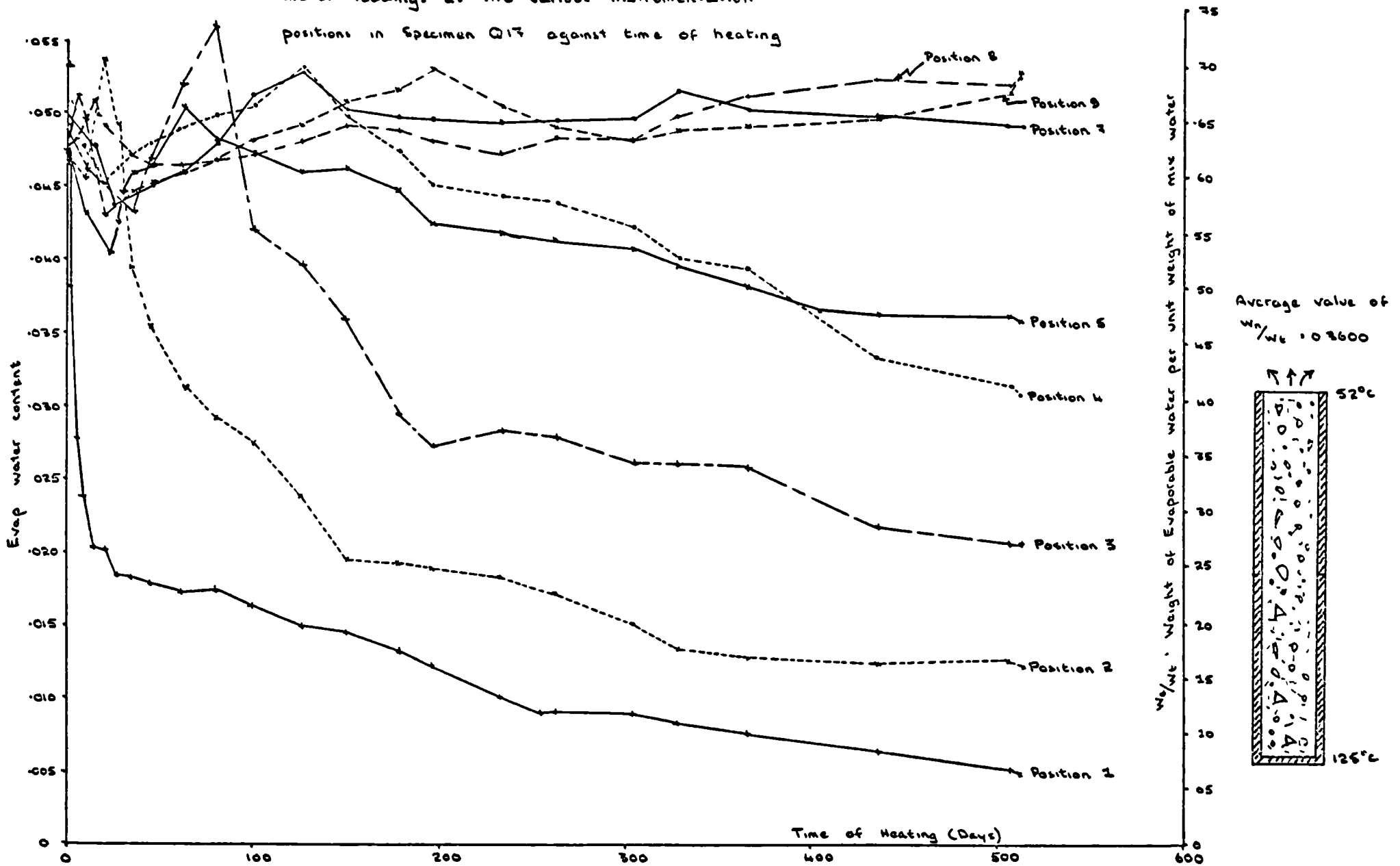


Figure 6:6 - Evaporable water distributions for Specimen B2 at various ages of heating

Fig 6:7 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen Q17 against time of heating



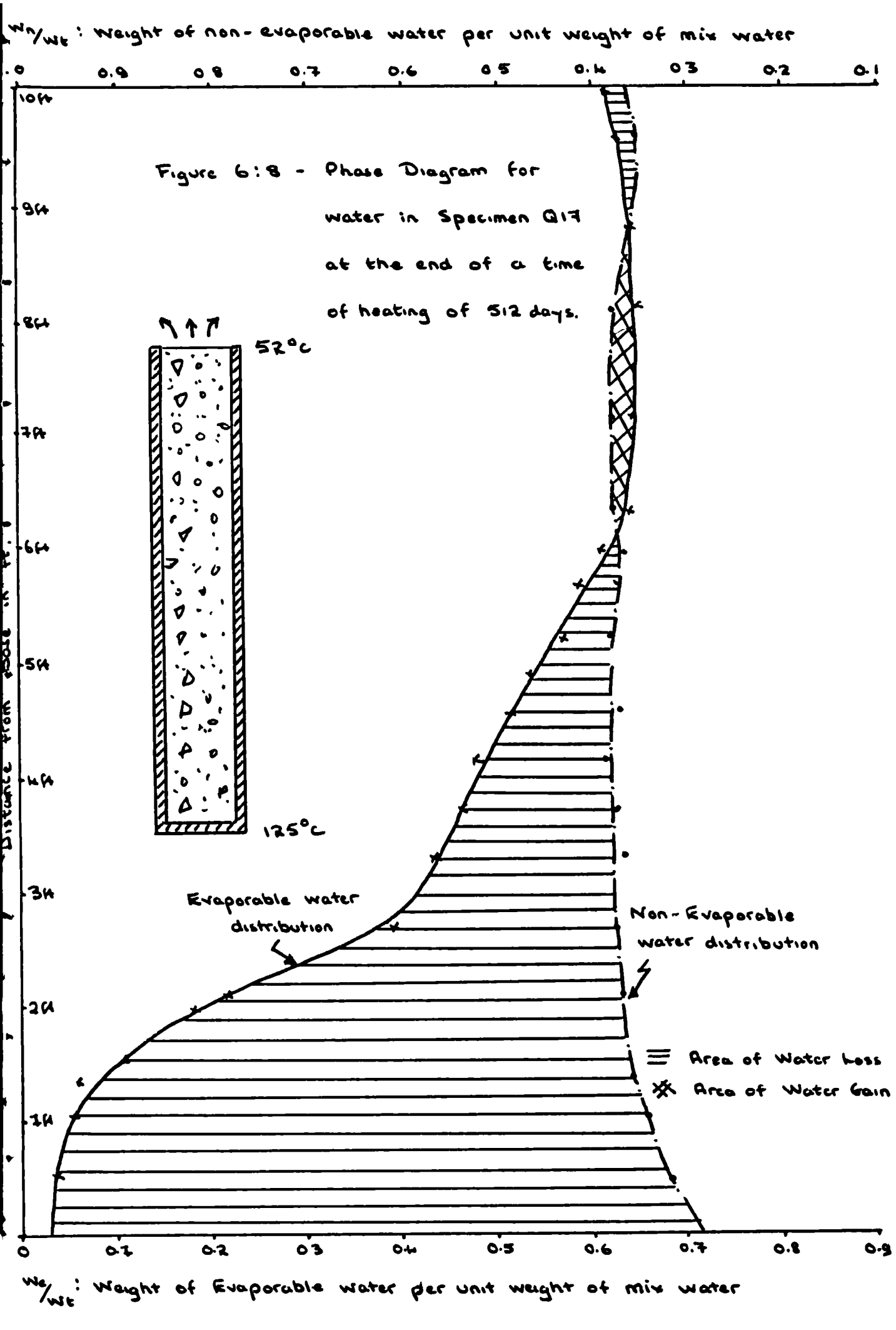


Figure 6:8 - Phase Diagram for water in Specimen Q17 at the end of a time of heating of 512 days.

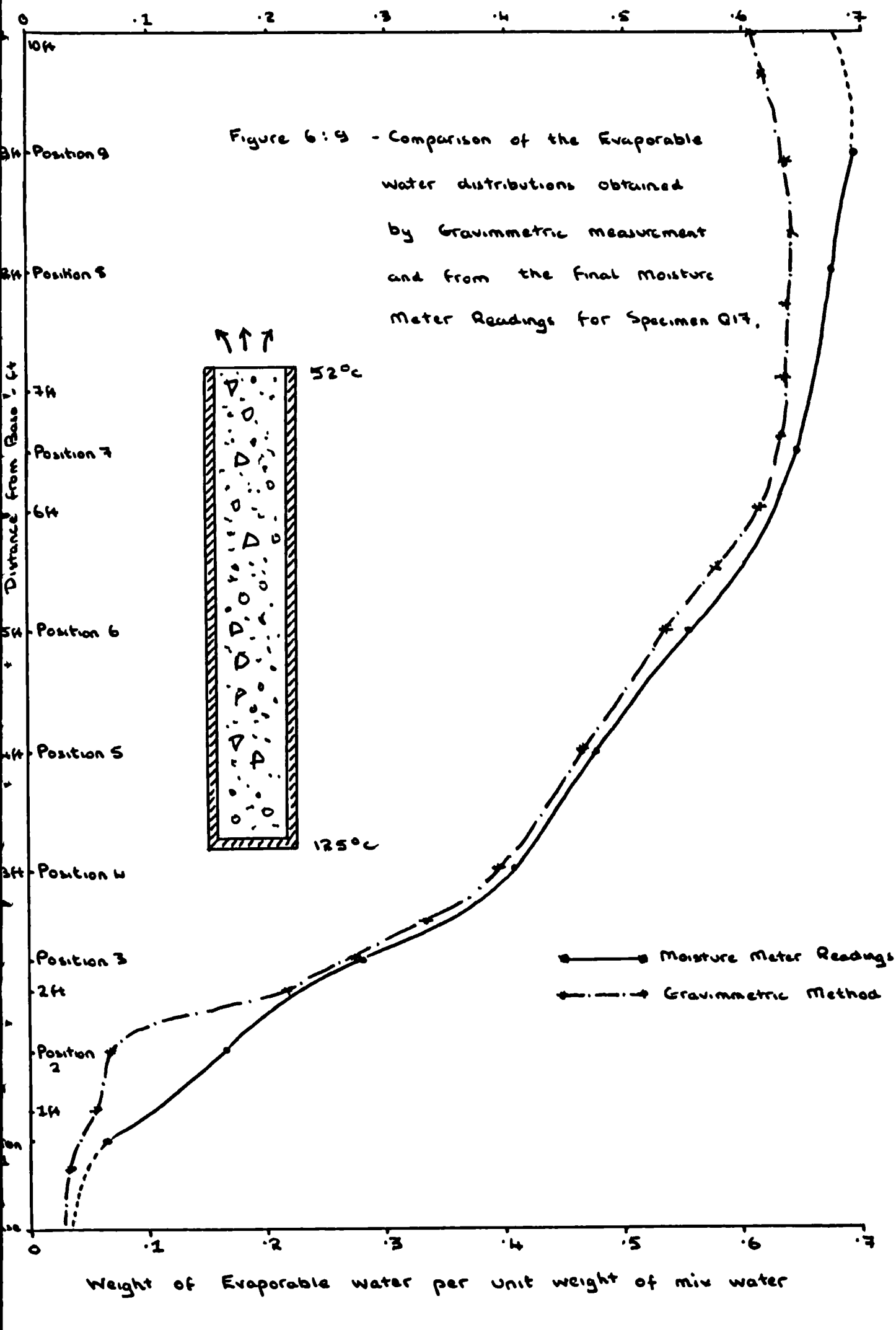


Figure 6:9 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurment and from the final Moisture Meter Readings for Specimen Q17.

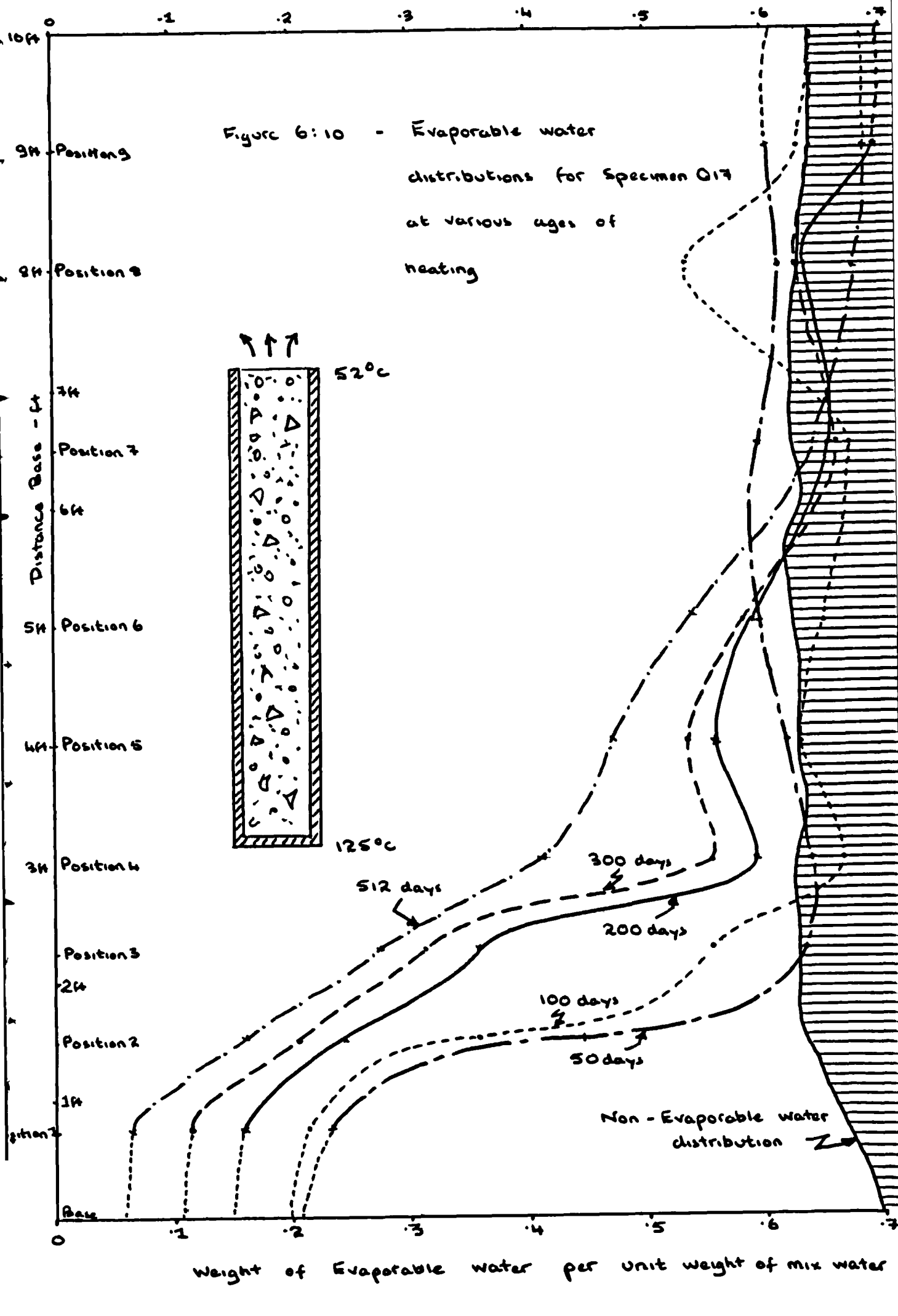


Figure 6:10 - Evaporable water distributions for Specimen 017 at various ages of heating

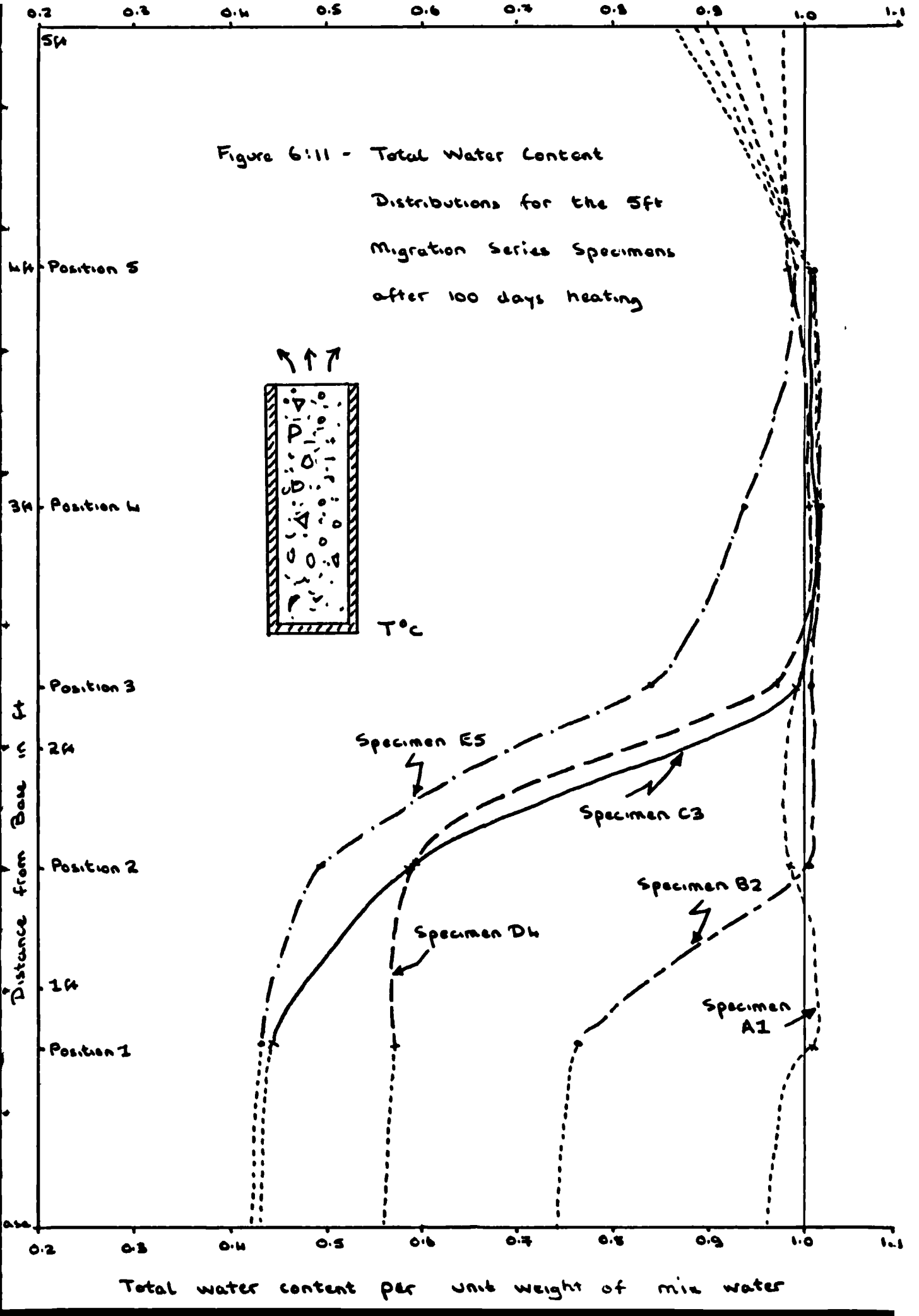


Figure 6:11 - Total Water Content Distributions for the 5ft Migration Series Specimens after 100 days heating

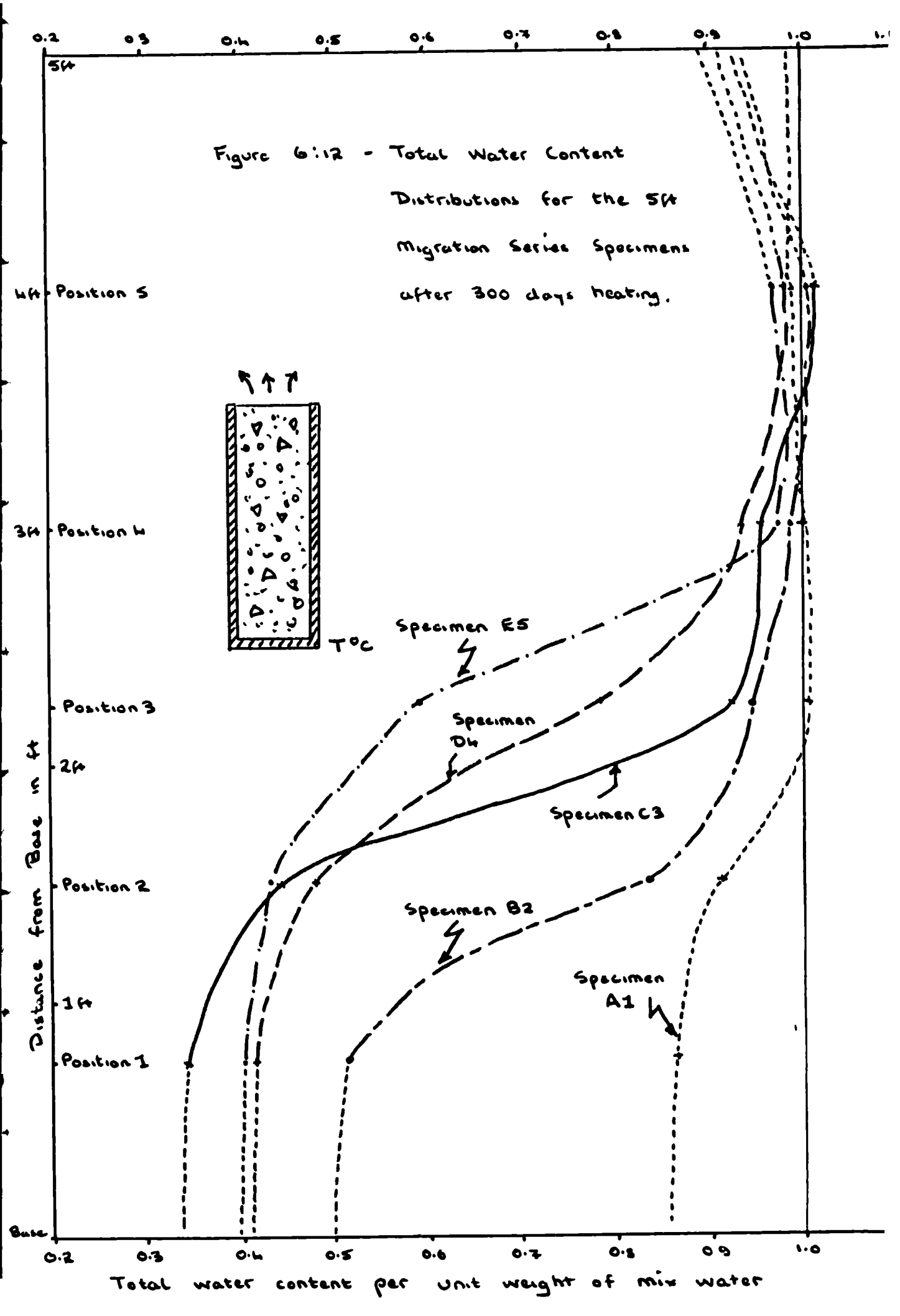


Figure 6:12 - Total Water Content Distributions for the 5ft Migration Series Specimens after 300 days heating.

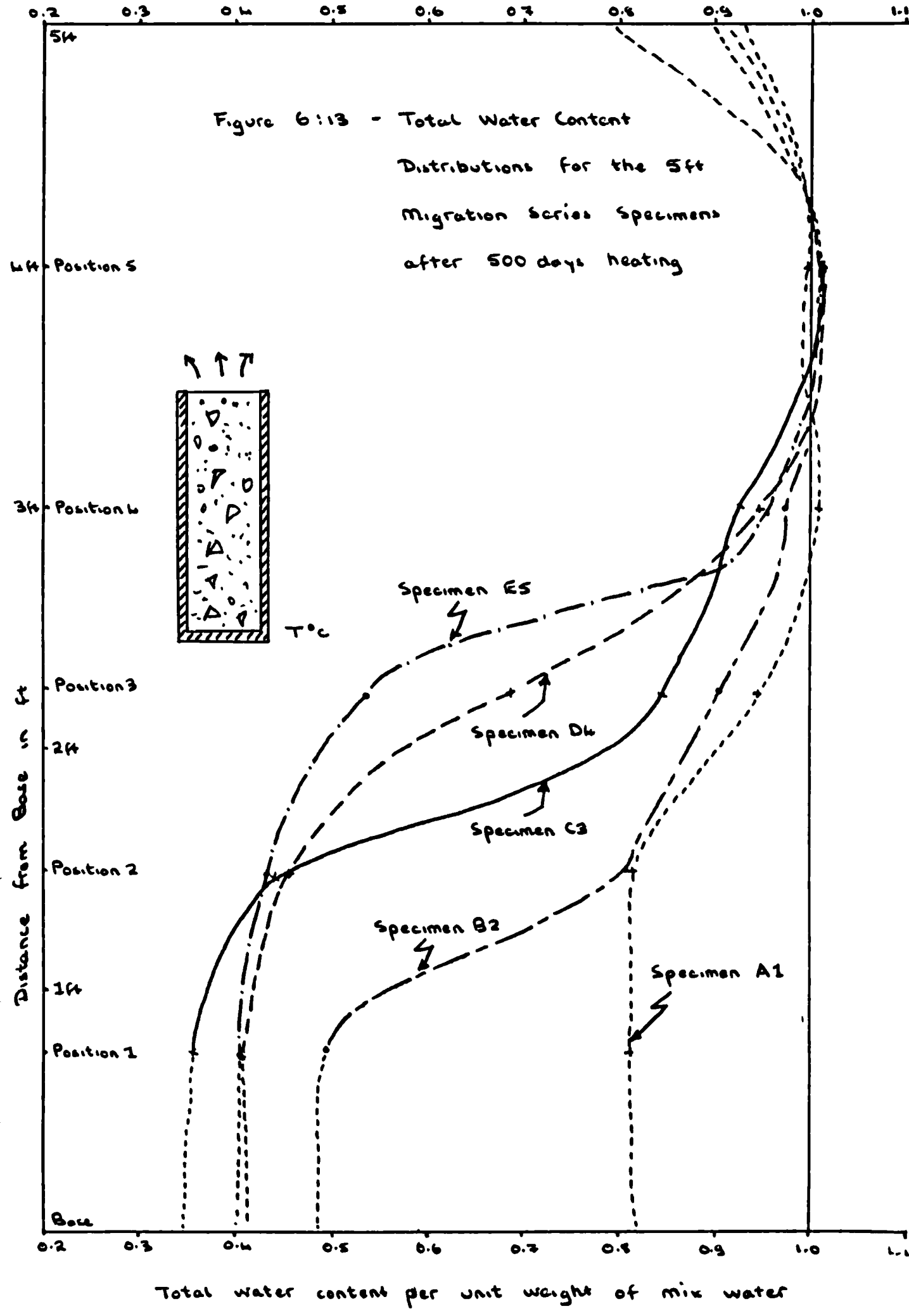


Figure 6:13 - Total Water Content Distributions for the 5ft Migration Series Specimens after 500 days heating

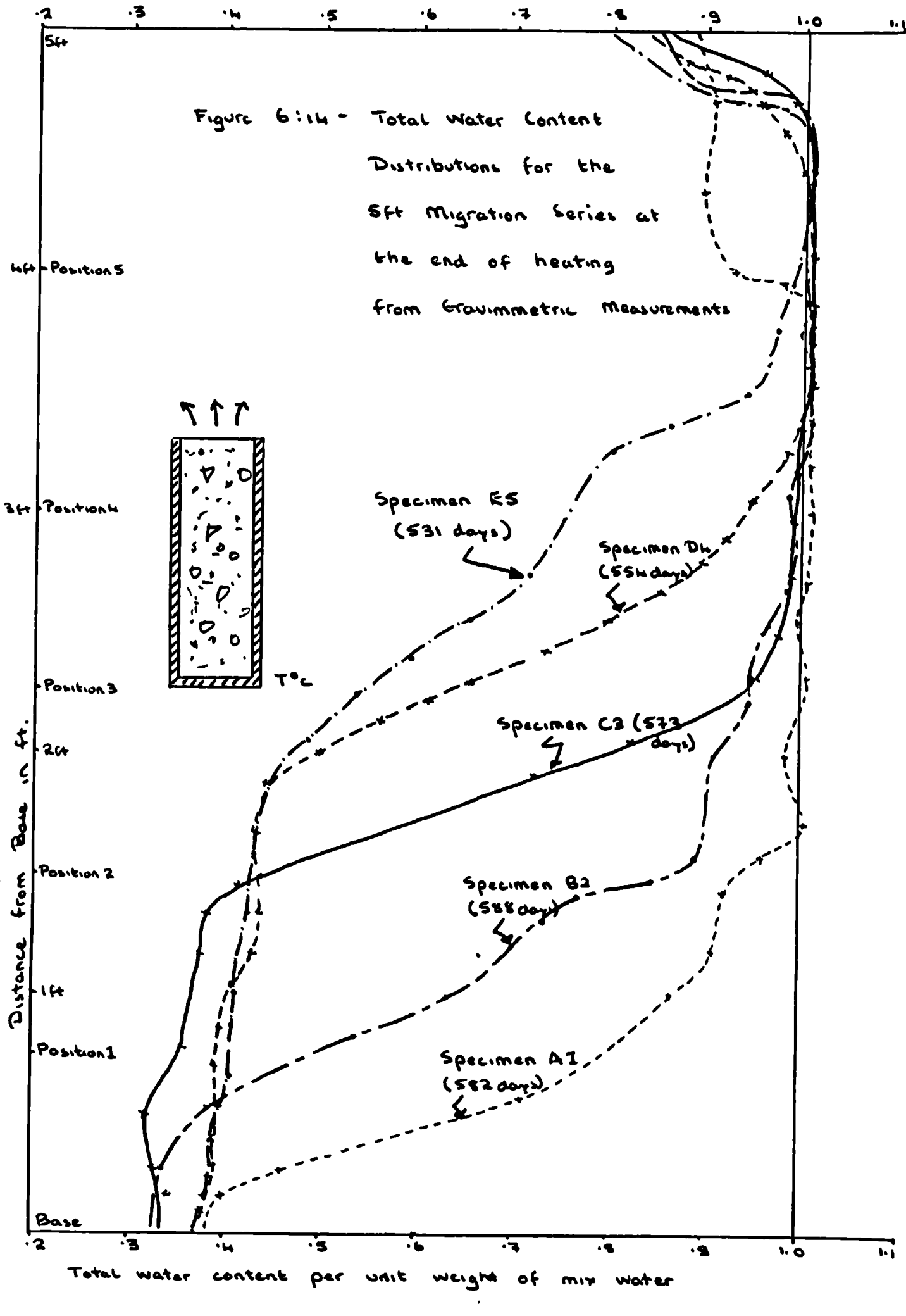


Figure 6:14 - Total Water Content Distributions for the 5ft Migration Series at the end of heating from Gravimmetric Measurements

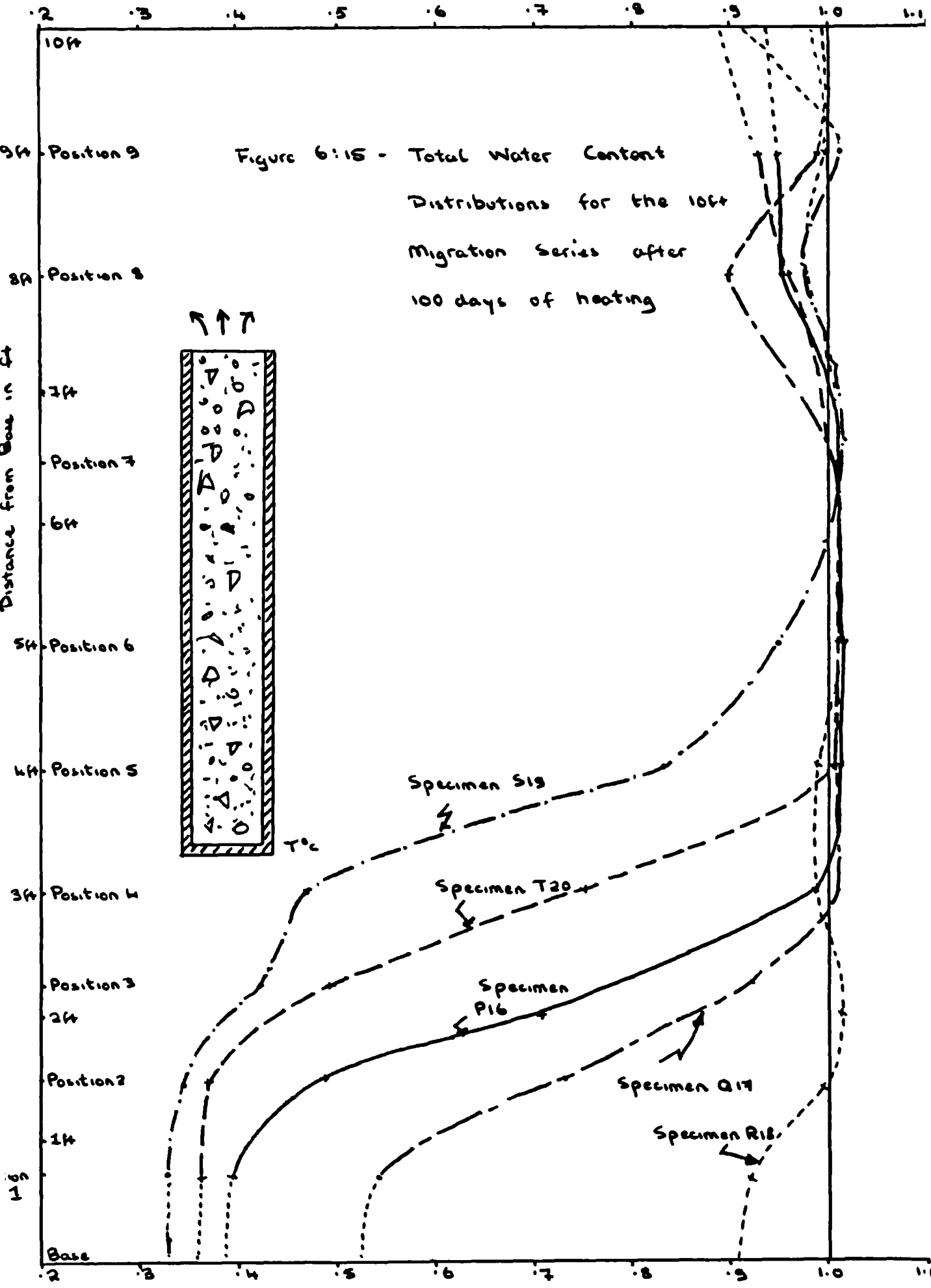


Figure 6:15 - Total Water Content Distributions for the 10ft Migration Series after 100 days of heating

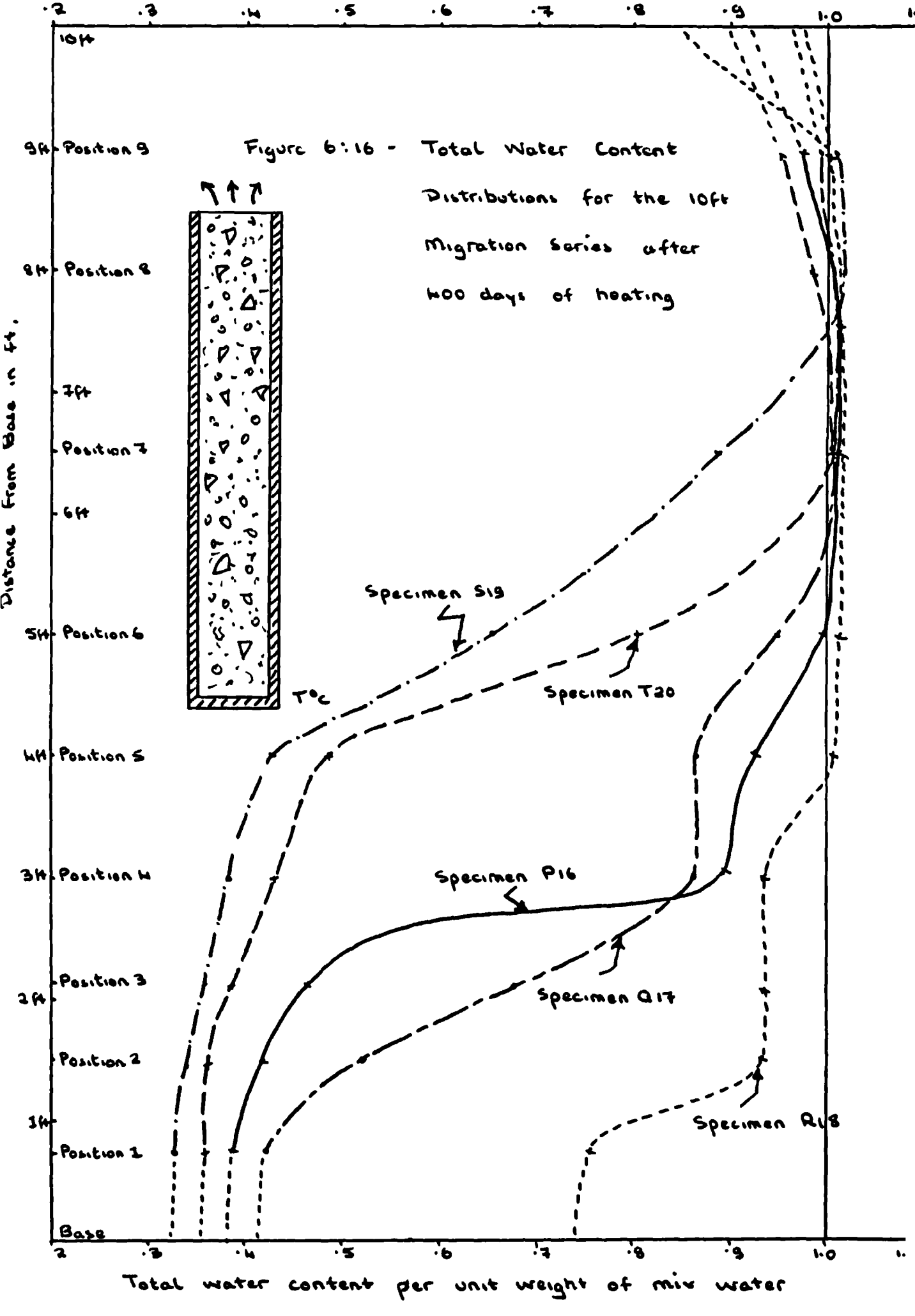


Figure 6:16 - Total Water Content Distributions for the 10ft Migration Series after 400 days of heating

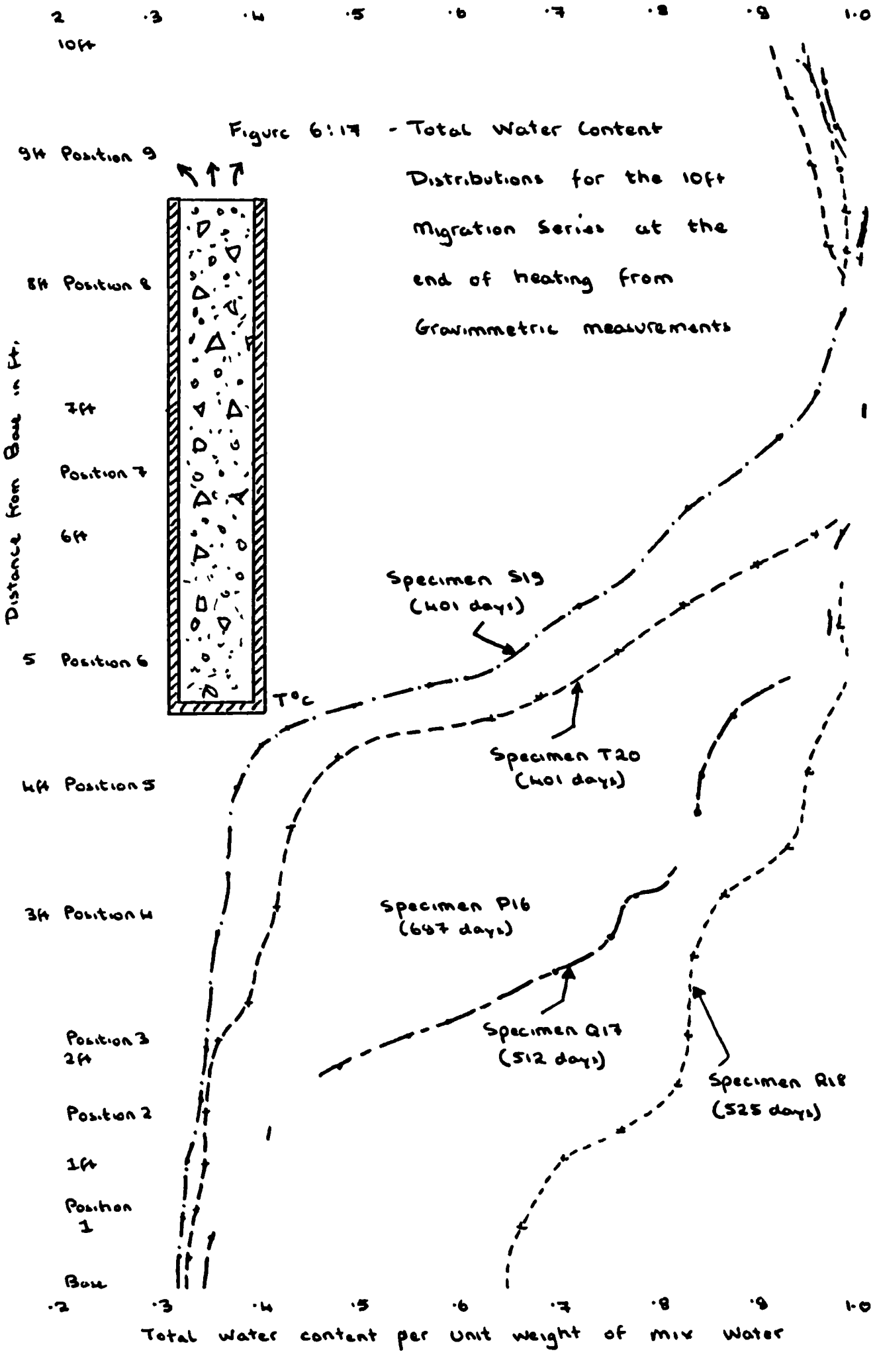


Figure 6:17 - Total Water Content Distributions for the 10ft Migration Series at the end of heating from Gravimmetric measurements

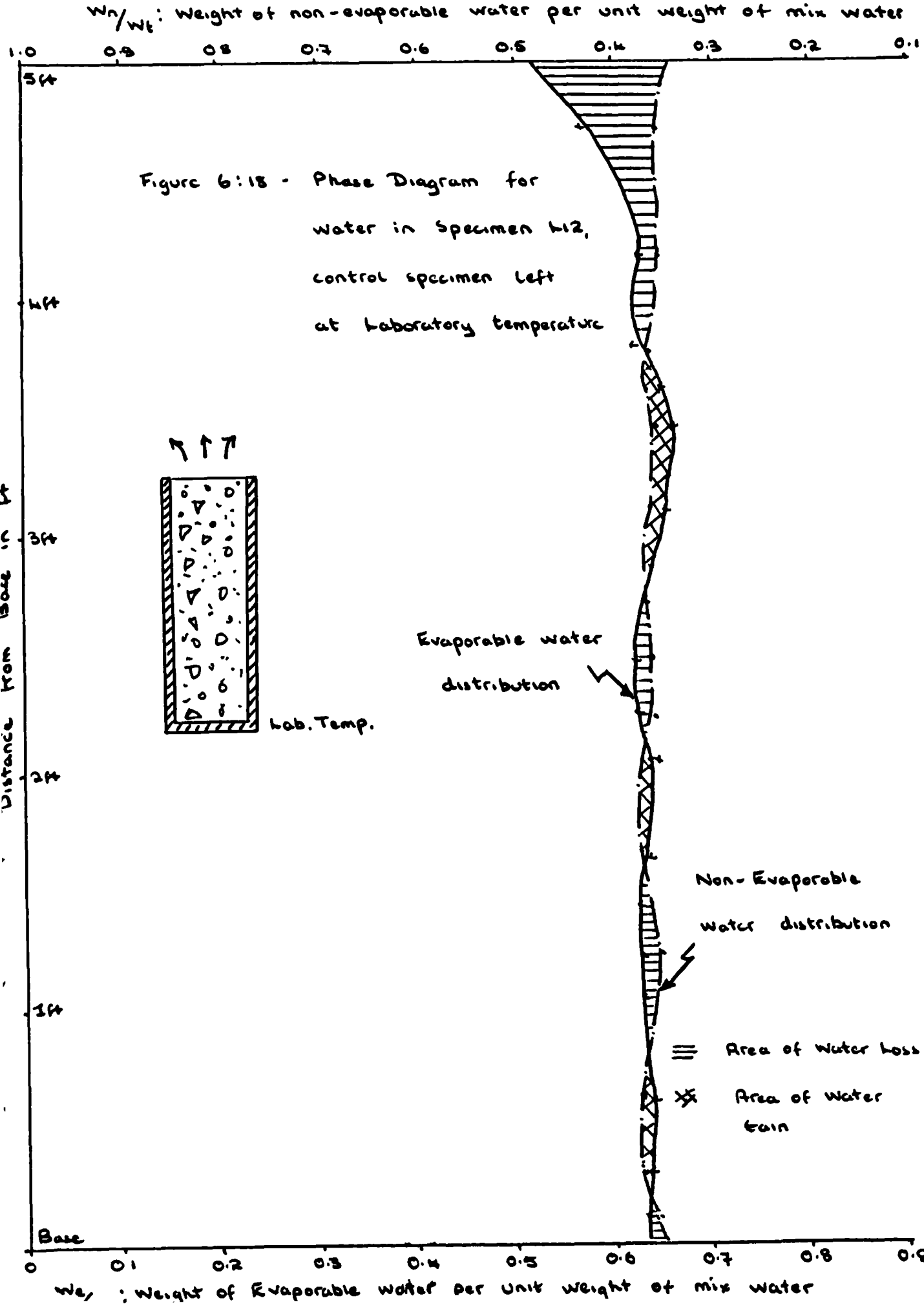


Figure 6:18 - Phase Diagram for water in Specimen M12, control specimen left at Laboratory temperature

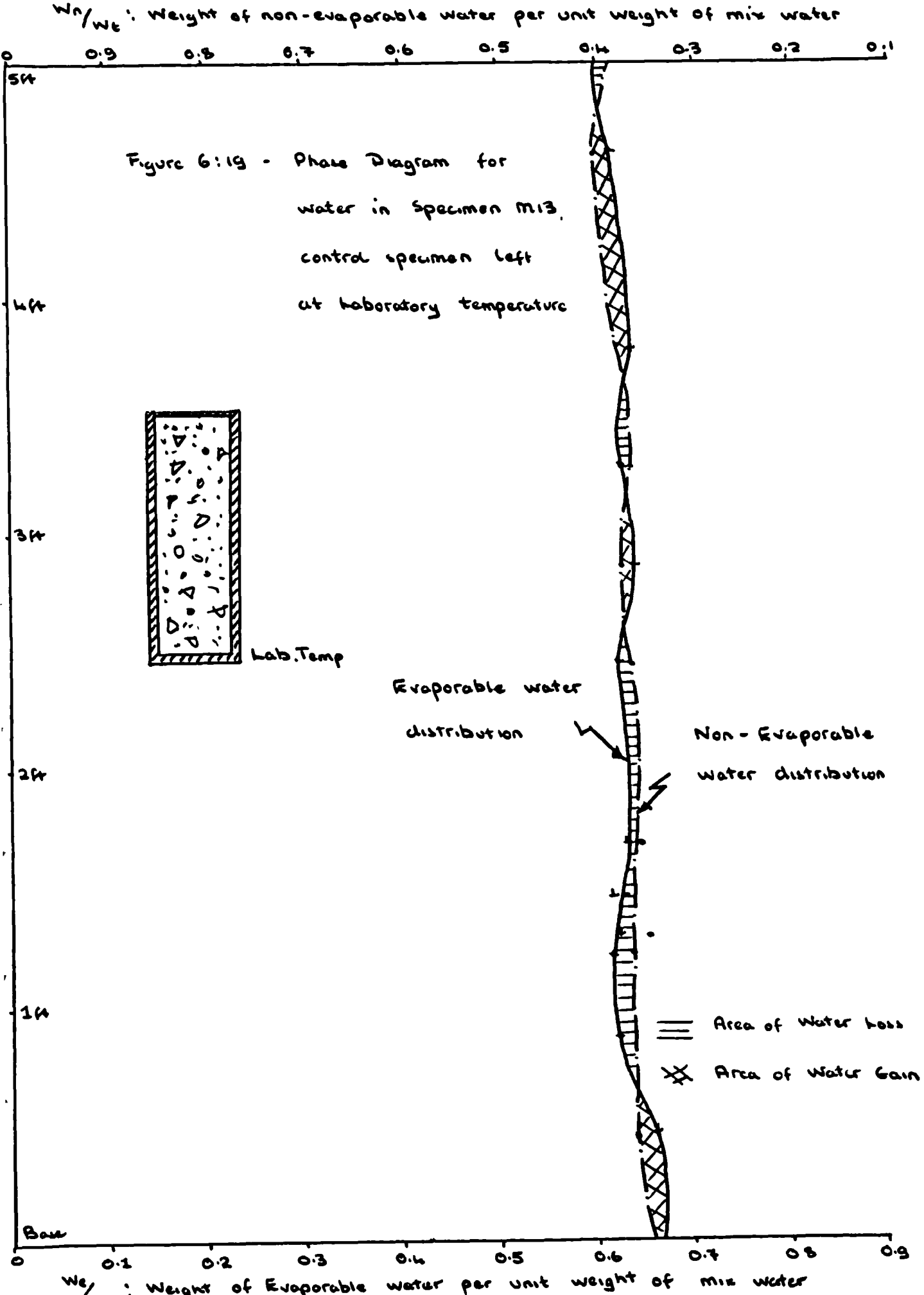
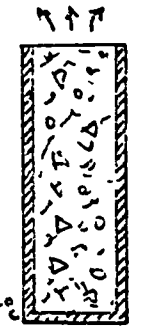


Figure 6:19 - Phase Diagram for water in Specimen M13. control specimen left at laboratory temperature

Specimen No*	A1	B2	C3	D4	E5	L1#	M1#3
Total Weight of concrete lbs	150 17	150 13	151 90	152 70	151 40	148 97	148 84
Weight of Mix Water lbs	11 31	11 30	11 44	11 50	11 20	11 22	11 21
Weight loss lbs	1 350	2 317	3 129	3 555	4 366	0 185	0 064
Percentage of Mix water lost	12 3	20 5	27 35	30 91	38 29	1 64	0 74

Fig 6·20 Graph of loss of weight against time of heating for the 5ft Migration Series Specimens



Specimen E5
Base Temp - 200°c

Specimen D4
Base Temp - 175°c

Specimen C3
Base Temp - 150°c

Specimen B2
Base Temp 125°c

Specimen A1
Base Temp - 105°c

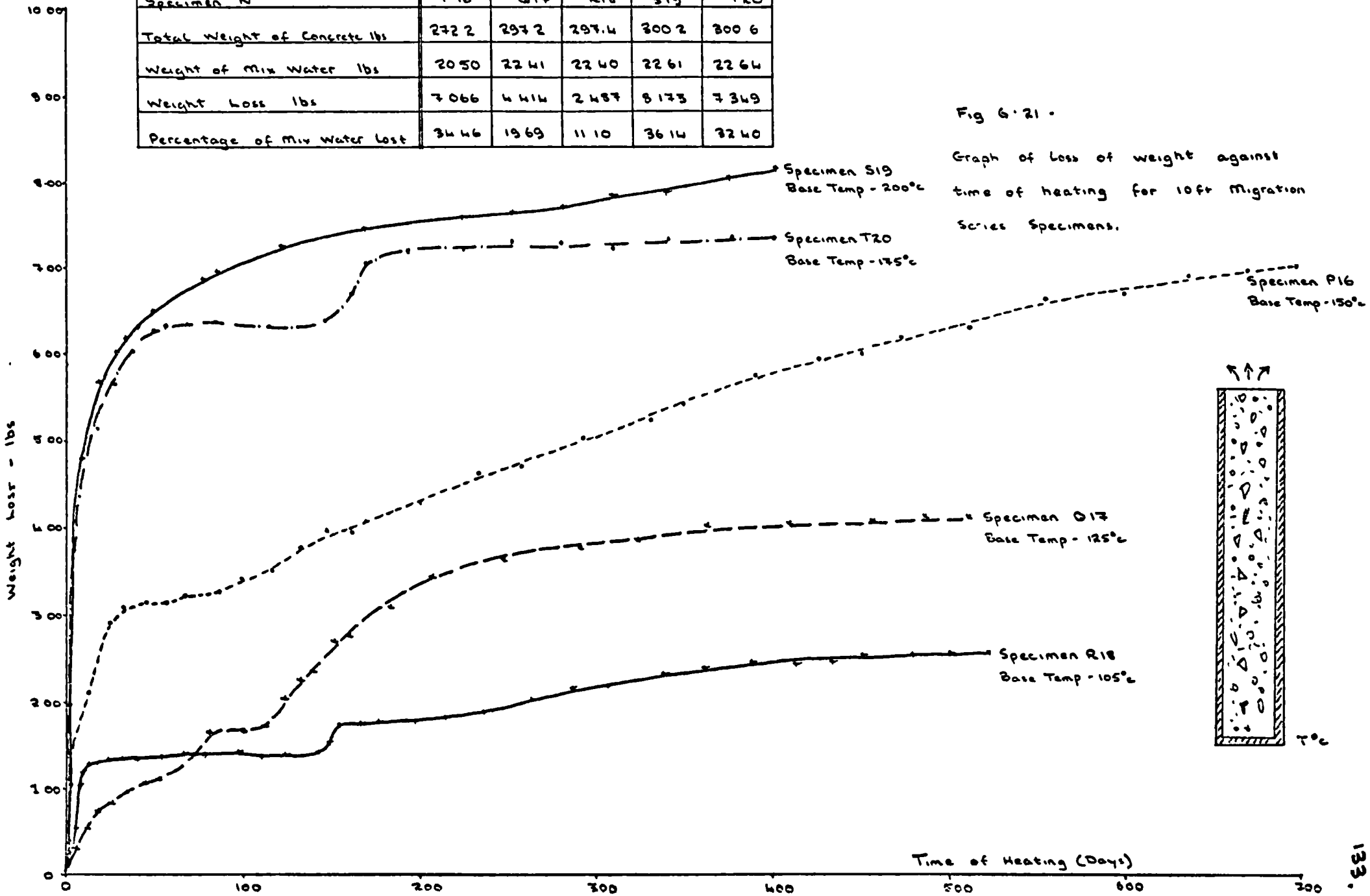
Weight Loss - lbs

Time of Heating (Days)

Specimen N°	P16	Q17	R18	S19	T20
Total Weight of Concrete lbs	272 2	297 2	297.4	300 2	300 6
Weight of Mix Water lbs	20 50	22 41	22 40	22 61	22 64
Weight Loss lbs	7 066	4 414	2 487	8 173	7 349
Percentage of Mix Water Lost	34 46	19 69	11 10	36 14	32 40

Fig 6·21·

Graph of loss of weight against time of heating for 10ft Migration Series Specimens.



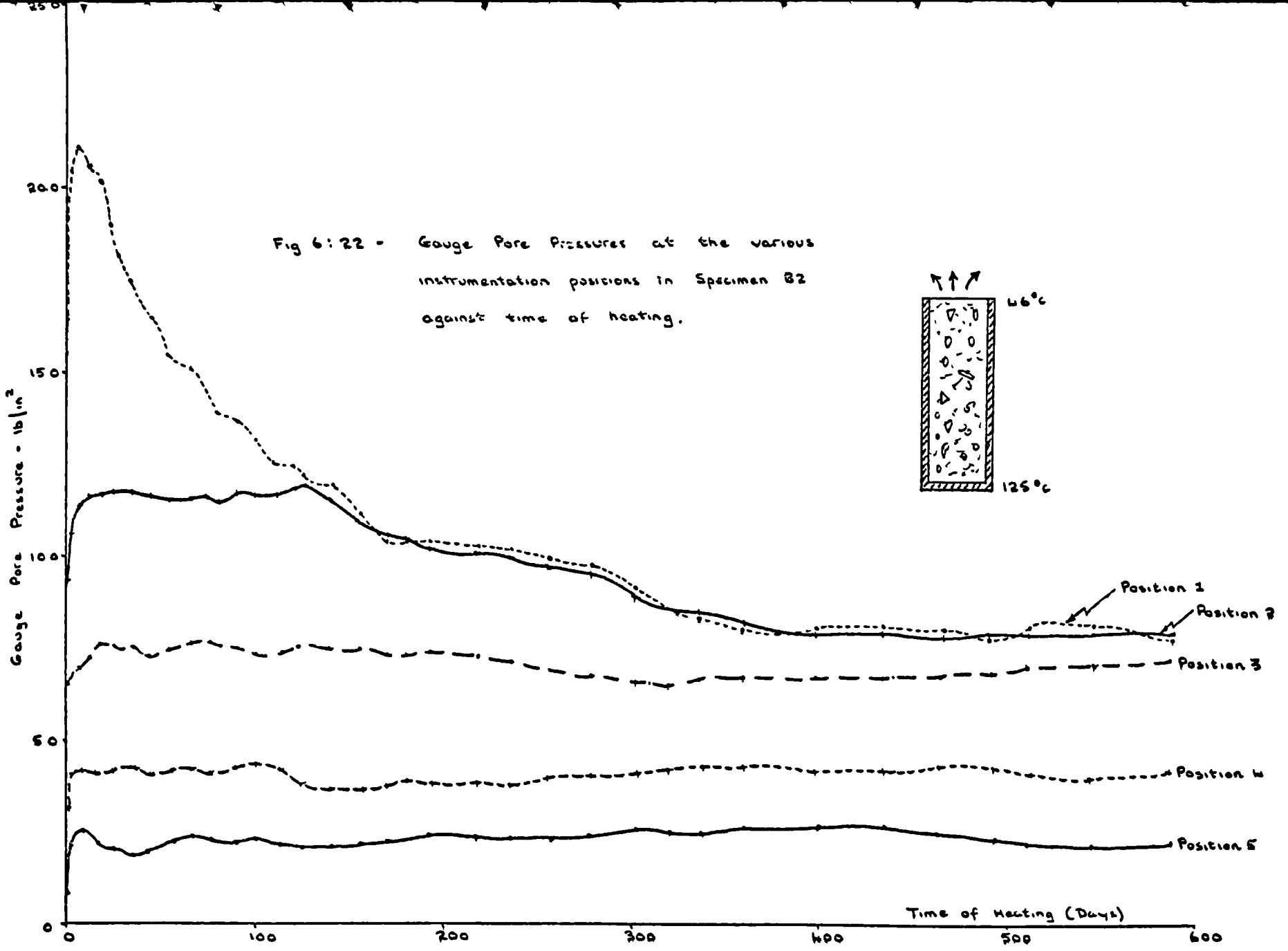


Fig 6:22 - Gauge Pore Pressures at the various instrumentation positions in Specimen B2 against time of heating.

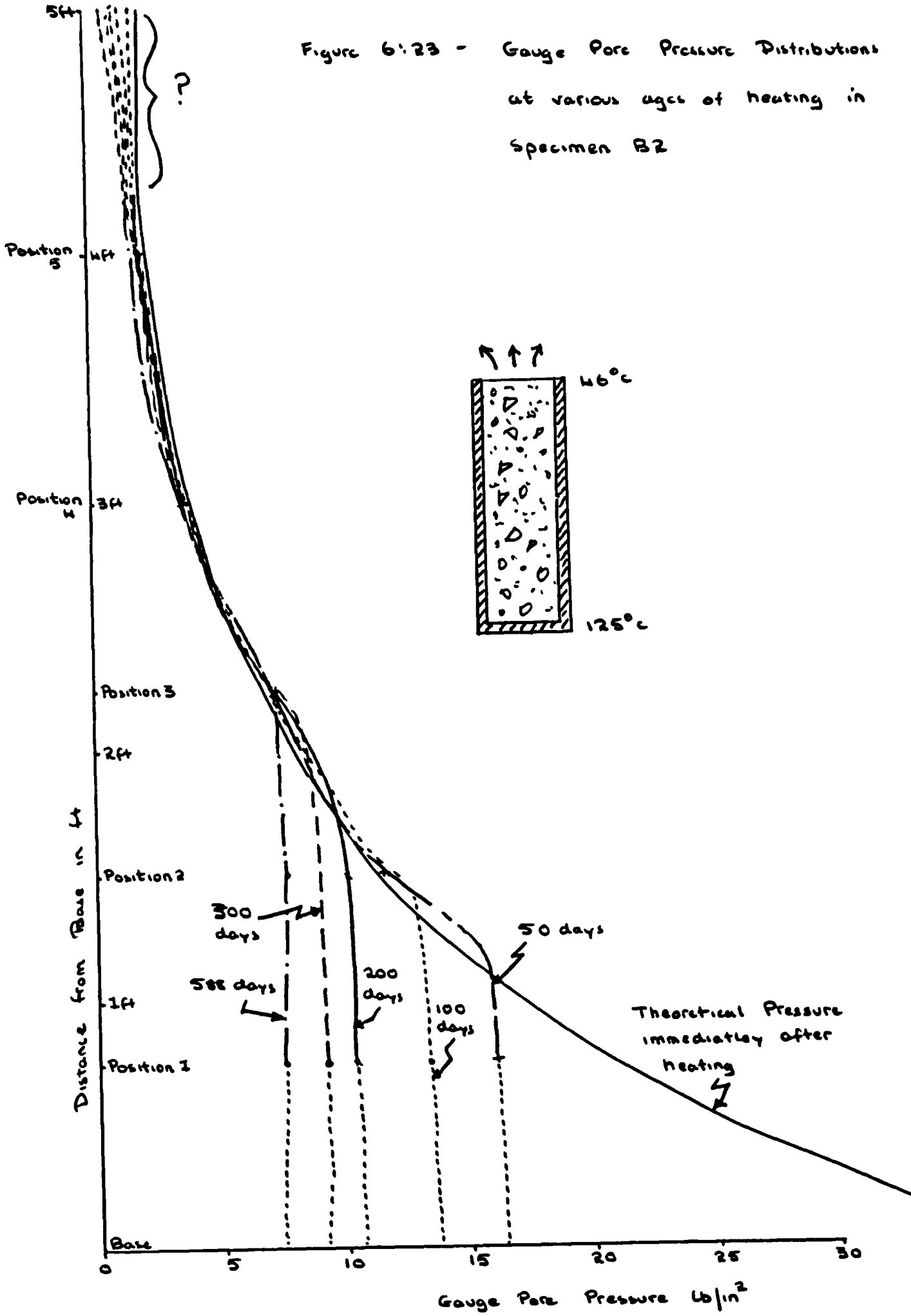


Figure 6:23 - Gauge Pore Pressure Distributions at various ages of heating in Specimen B2

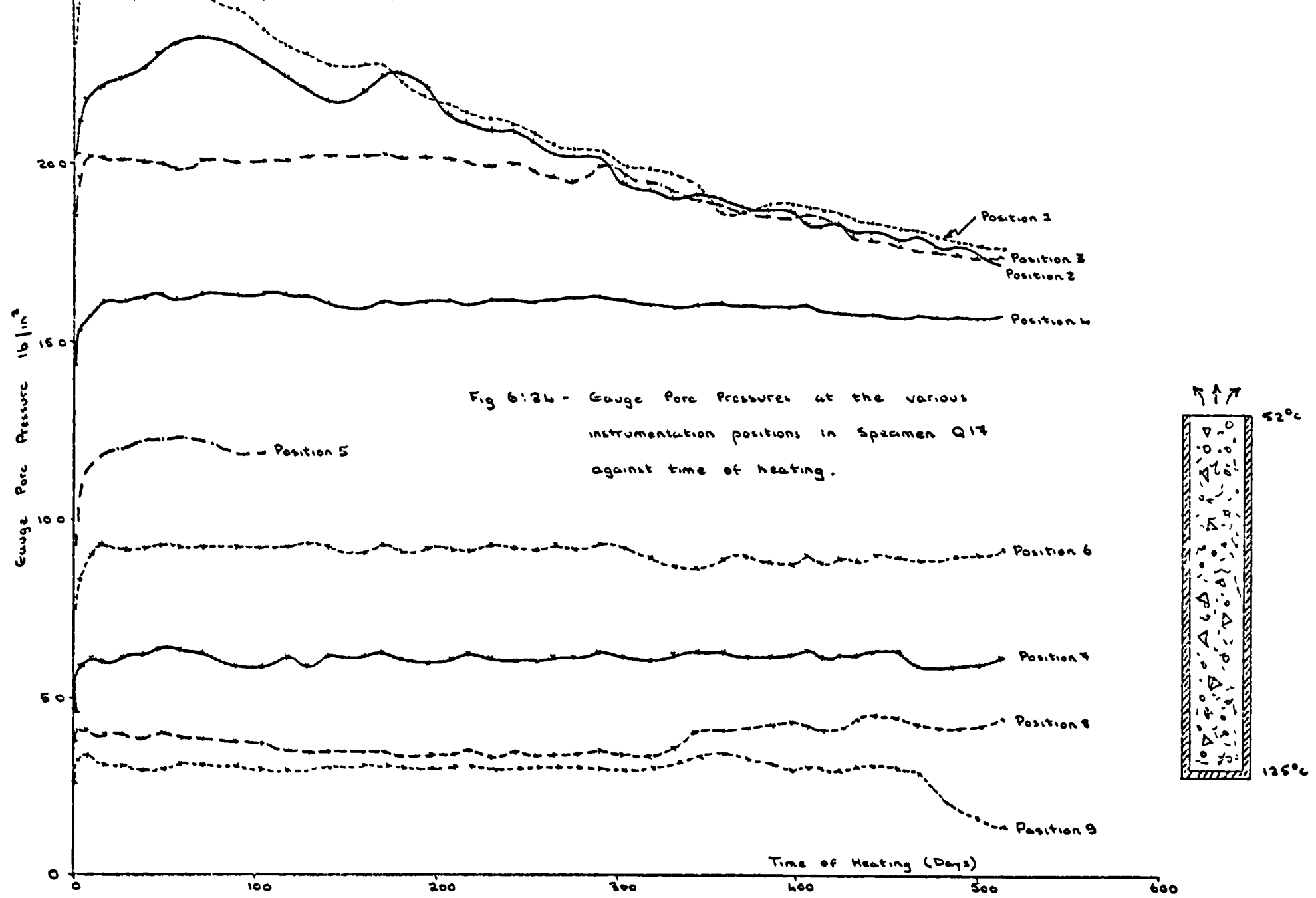


Fig 6:24 - Gauge Pore Pressures at the various instrumentation positions in Specimen Q17 against time of heating.

Figure 6:25 - Gauge Pore Pressure Distributions at various ages of heating in Specimen Q17

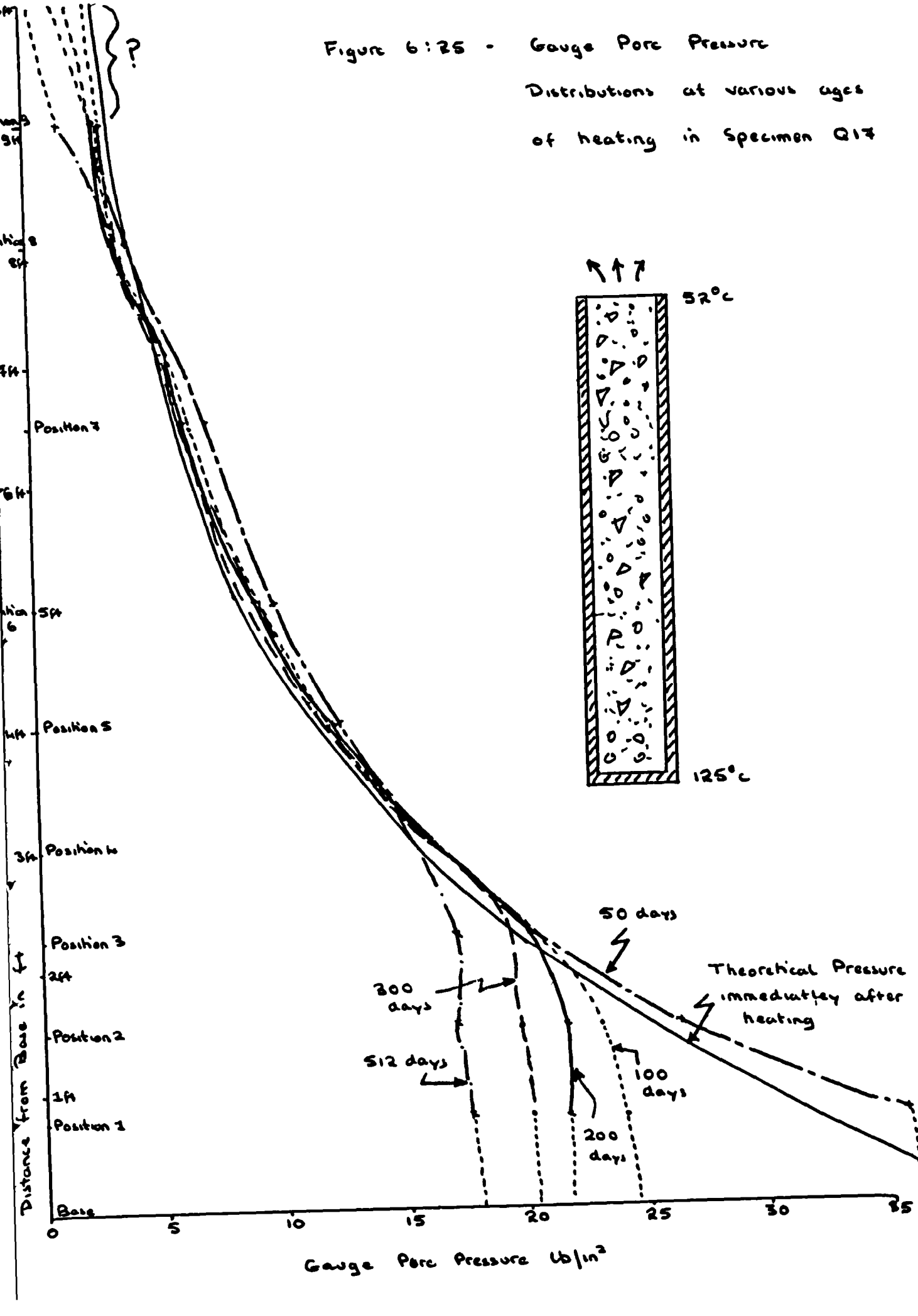
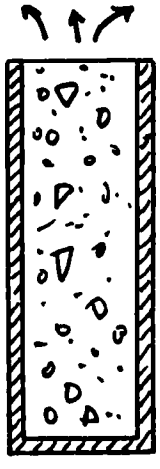


Figure 6:26 - Gauge Pore Pressure distributions for the 5ft Migration Series at 100 days heating



Specimen E5

Specimen A1

Specimen D4

Specimen B2

Specimen C3

Distance from Base in ft

0 10 20 30 40 50 60 70

Gauge Pore Pressure lb/in²

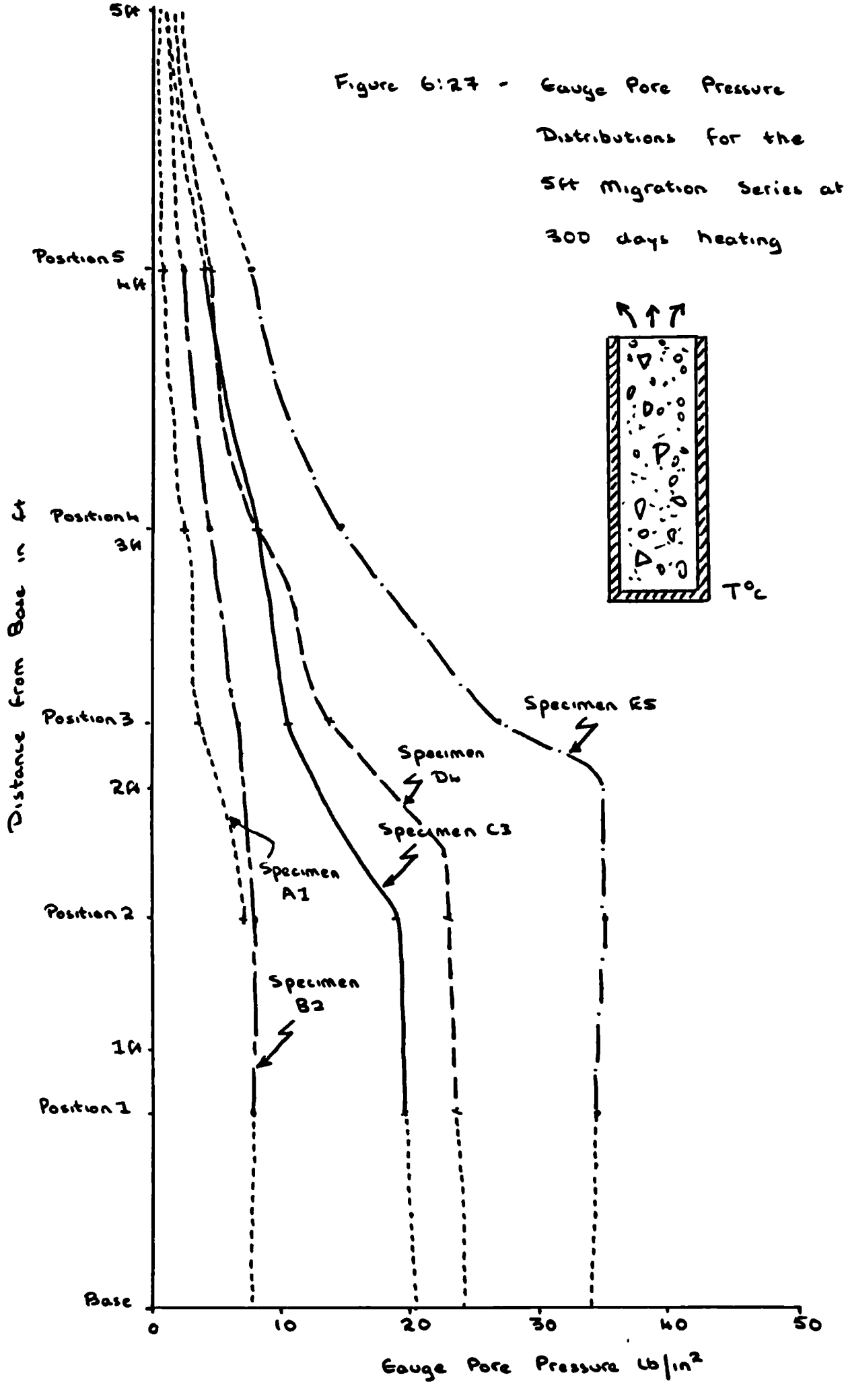


Figure 6:27 - Gauge Pore Pressure Distributions for the 5ft Migration Series at 300 days heating

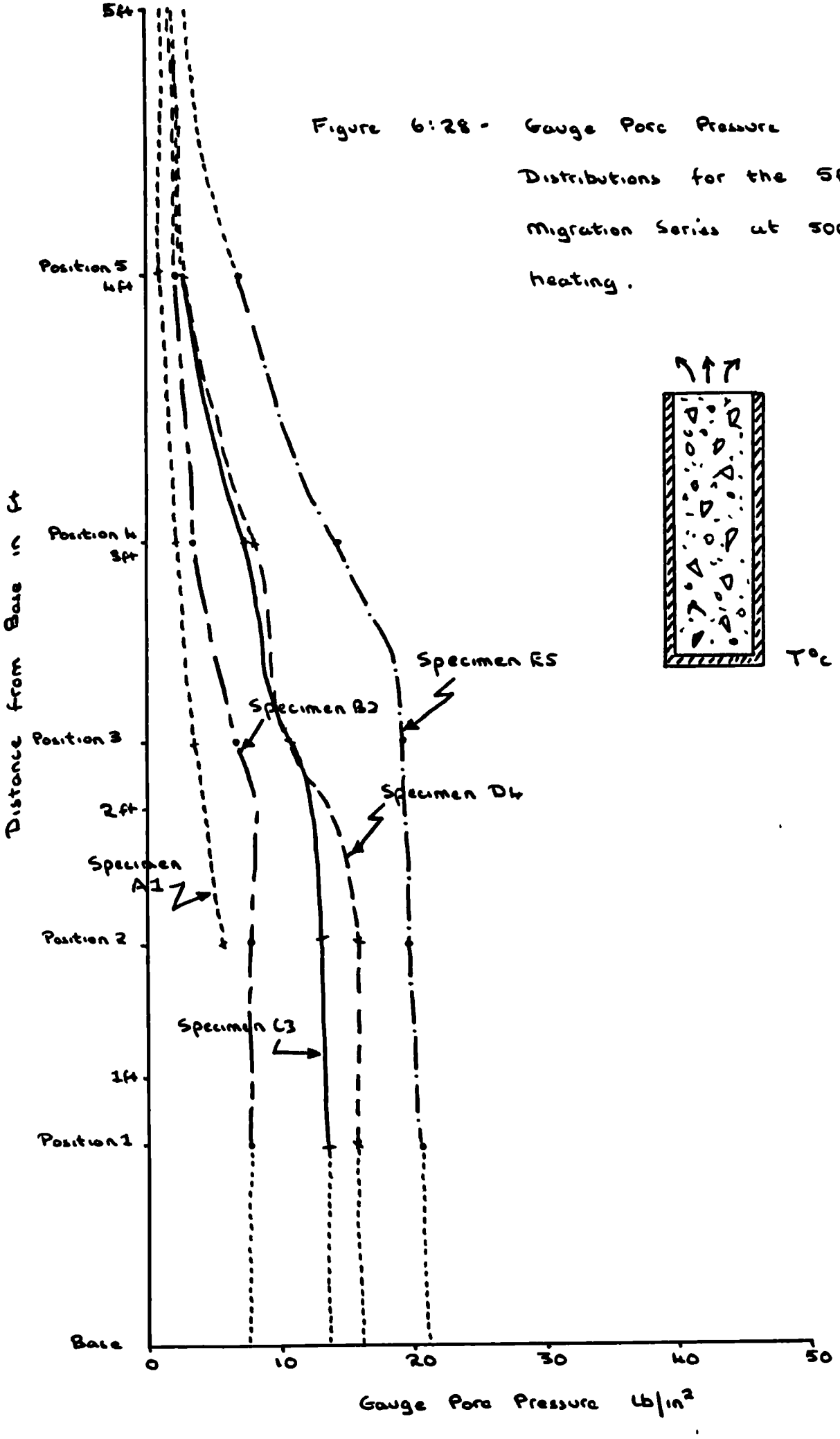


Figure 6:28 - Gauge Pore Pressure Distributions for the 5ft Migration Series at 500 days heating.

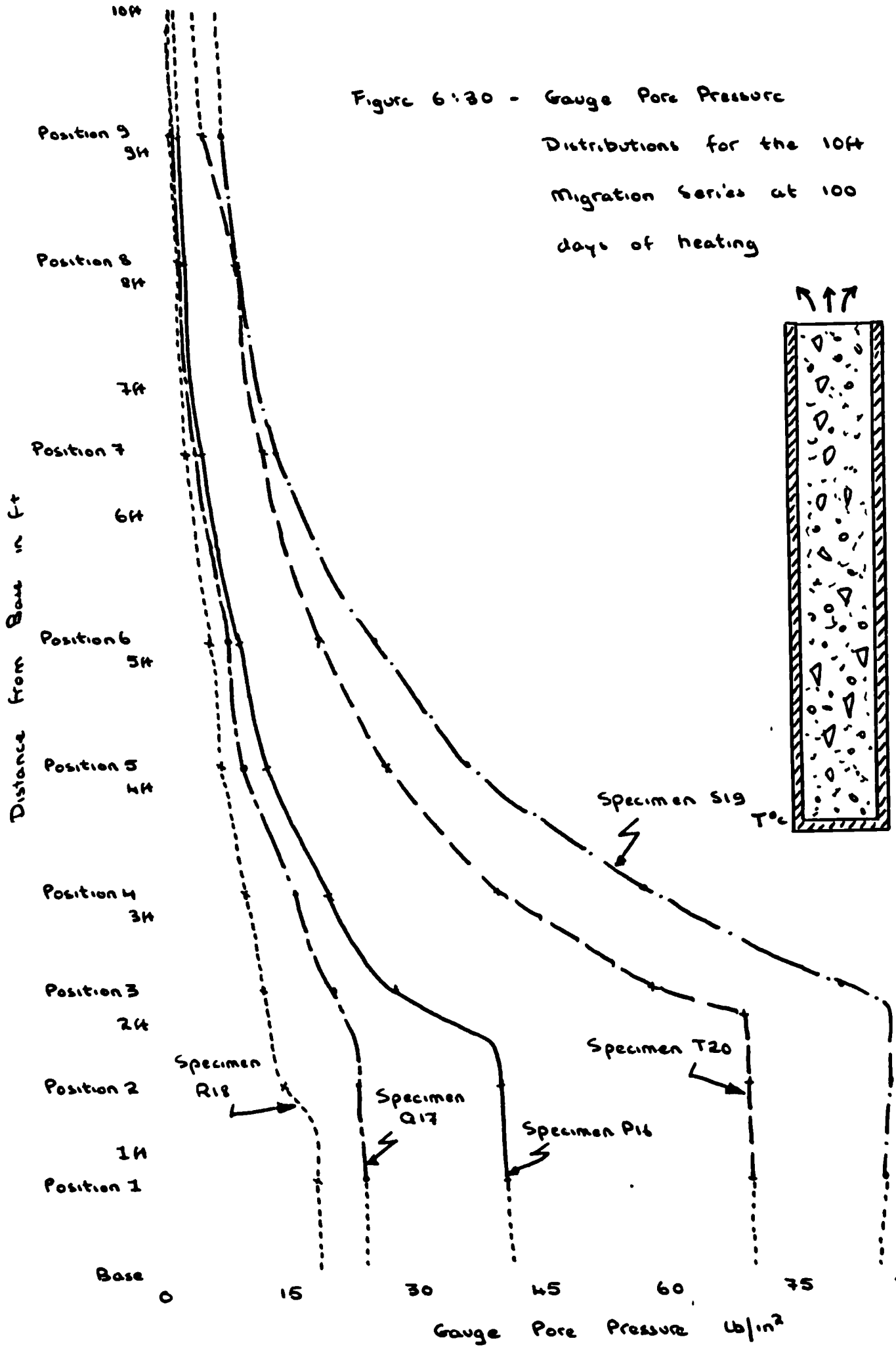


Figure 6:30 - Gauge Pore Pressure Distributions for the 10ft Migration Series at 100 days of heating

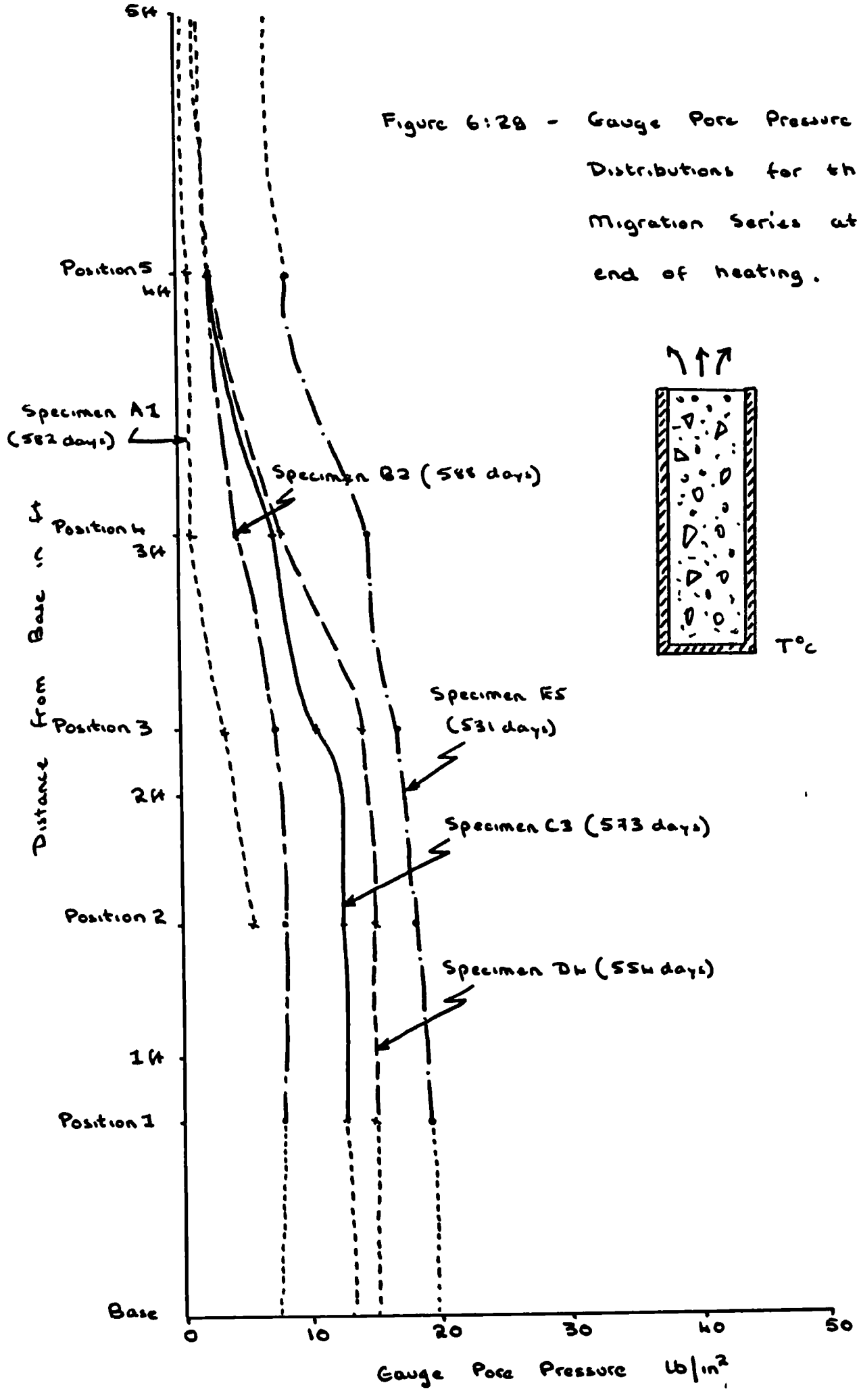


Figure 6:28 - Gauge Pore Pressure Distributions for the 5H Migration Series at the end of heating.

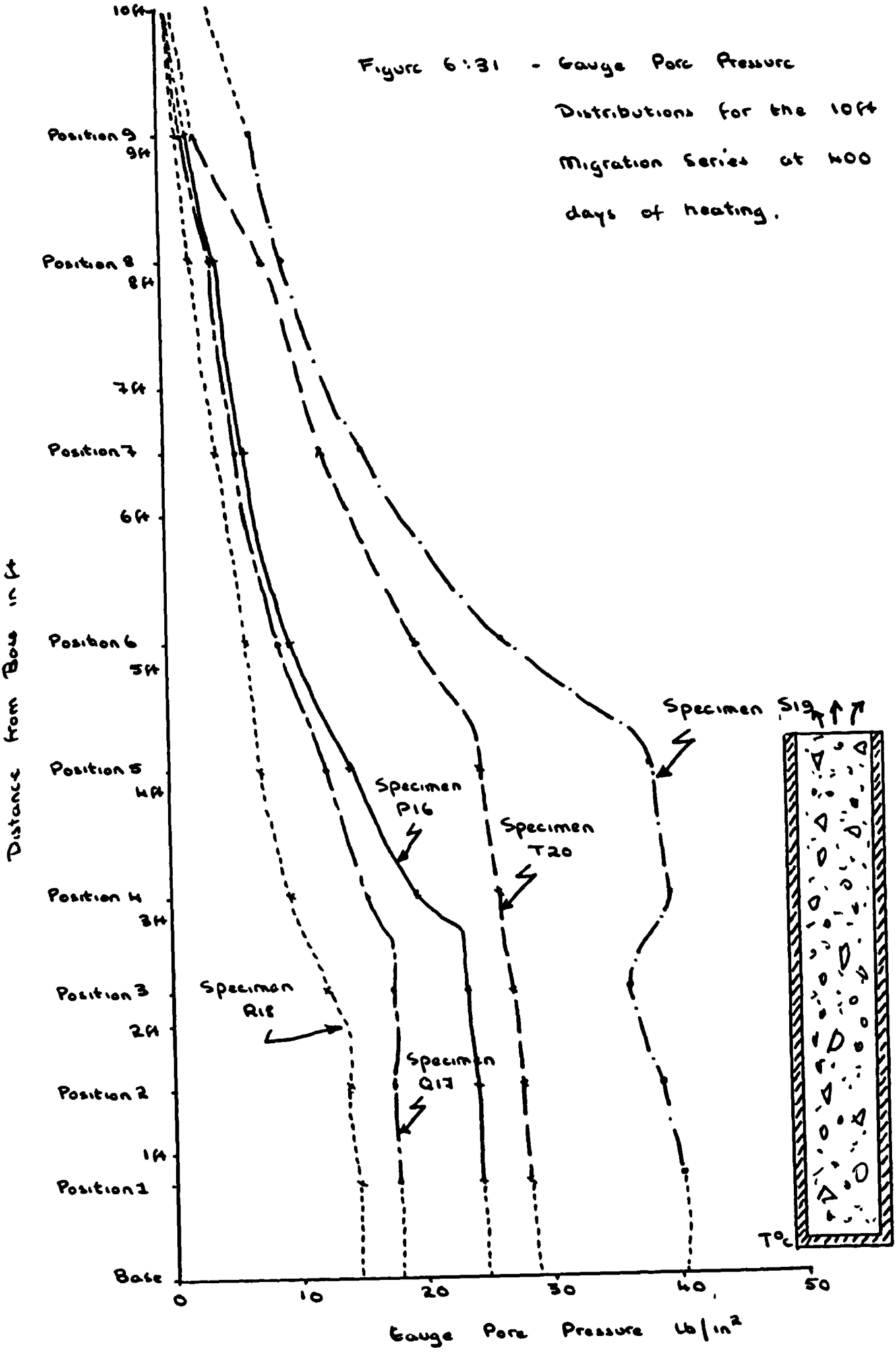


Figure 6:31 - Gauge Pore Pressure Distributions for the 10ft Migration Series at 400 days of heating.

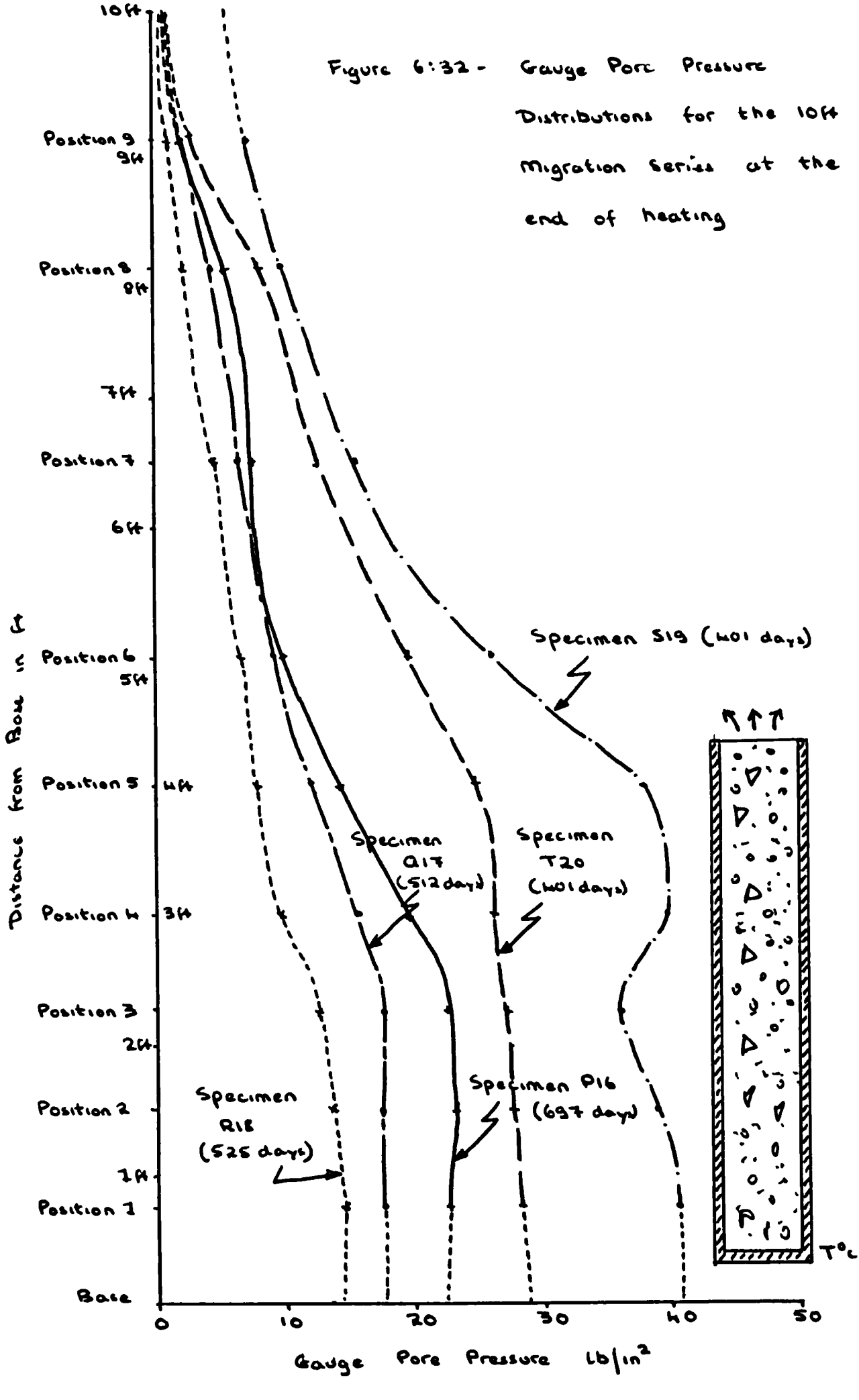


Figure 6:32 - Gauge Pore Pressure Distributions for the 10ft Migration Series at the end of heating

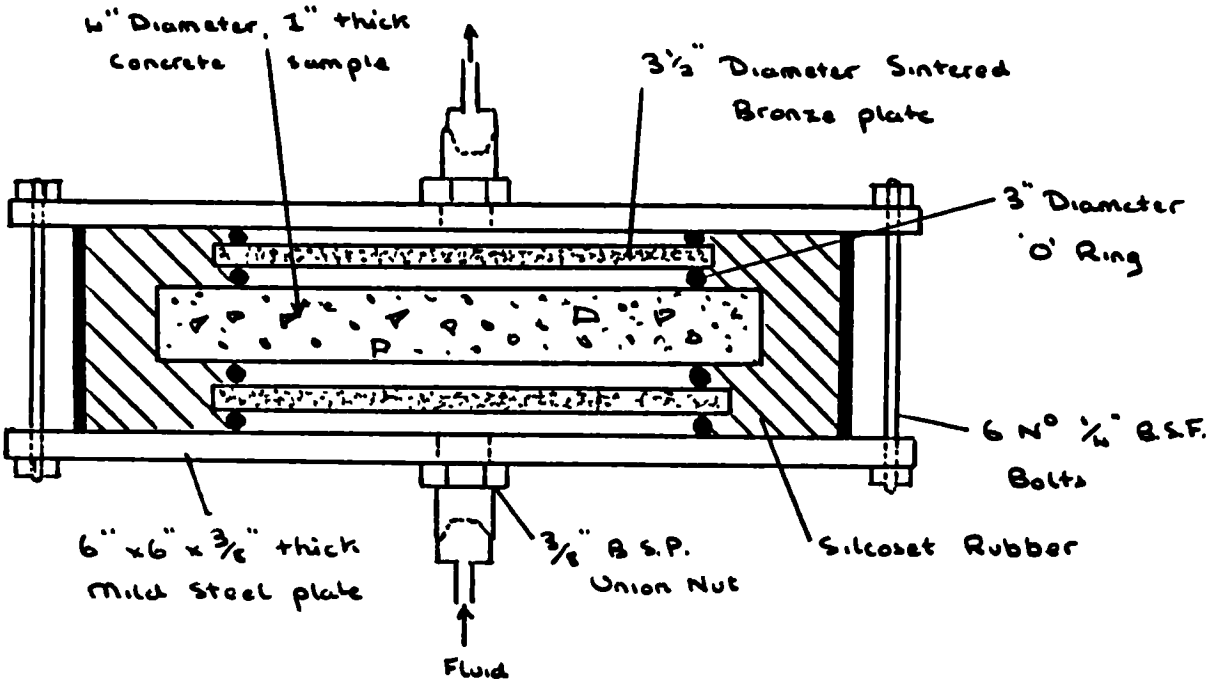


Figure 6·33 - Section through Permeameter (not to scale)

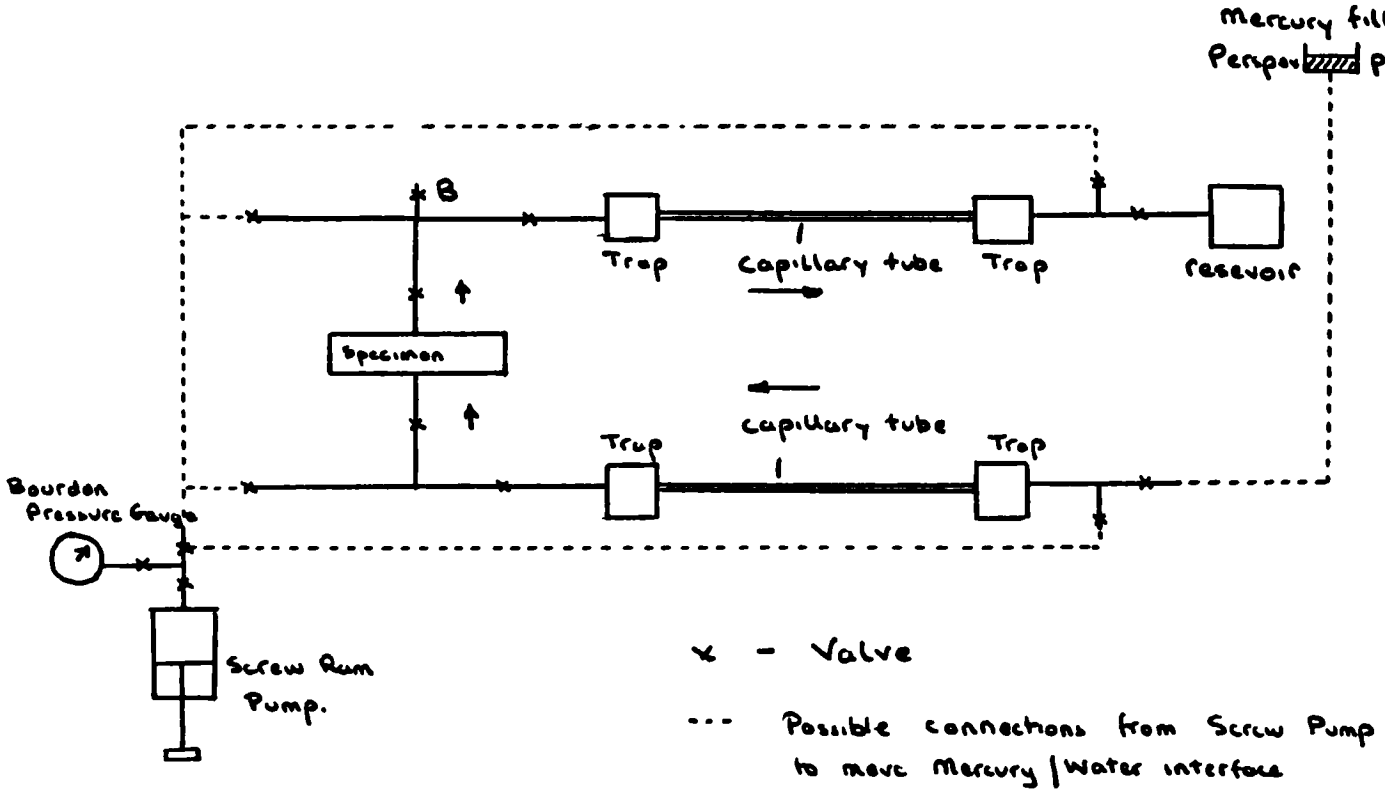


Figure 6·34 - Line Diagram of system used to measure permeability.

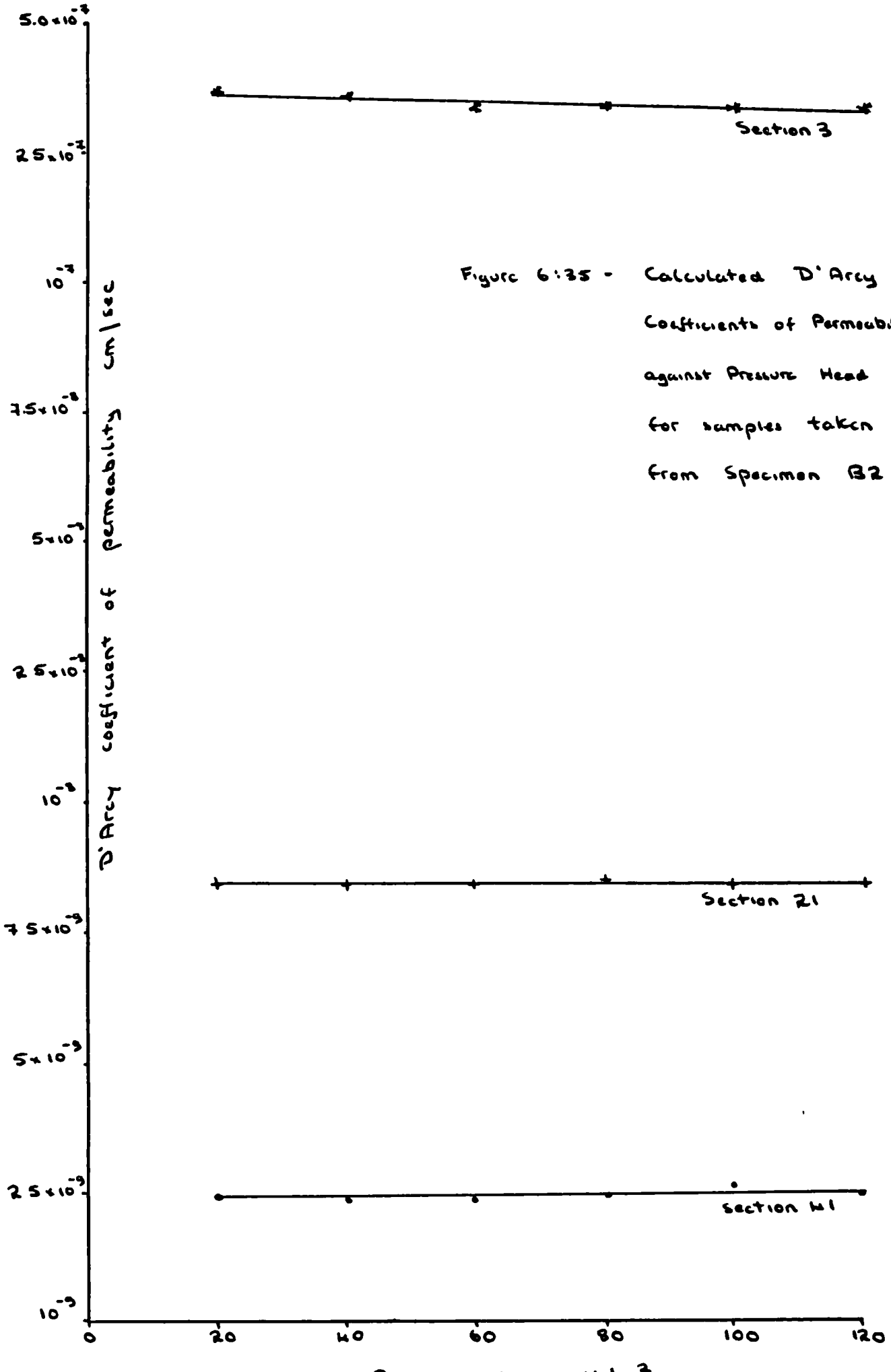


Figure 6:35 - Calculated D'Arcy Coefficients of Permeability against Pressure Head for samples taken from Specimen B2

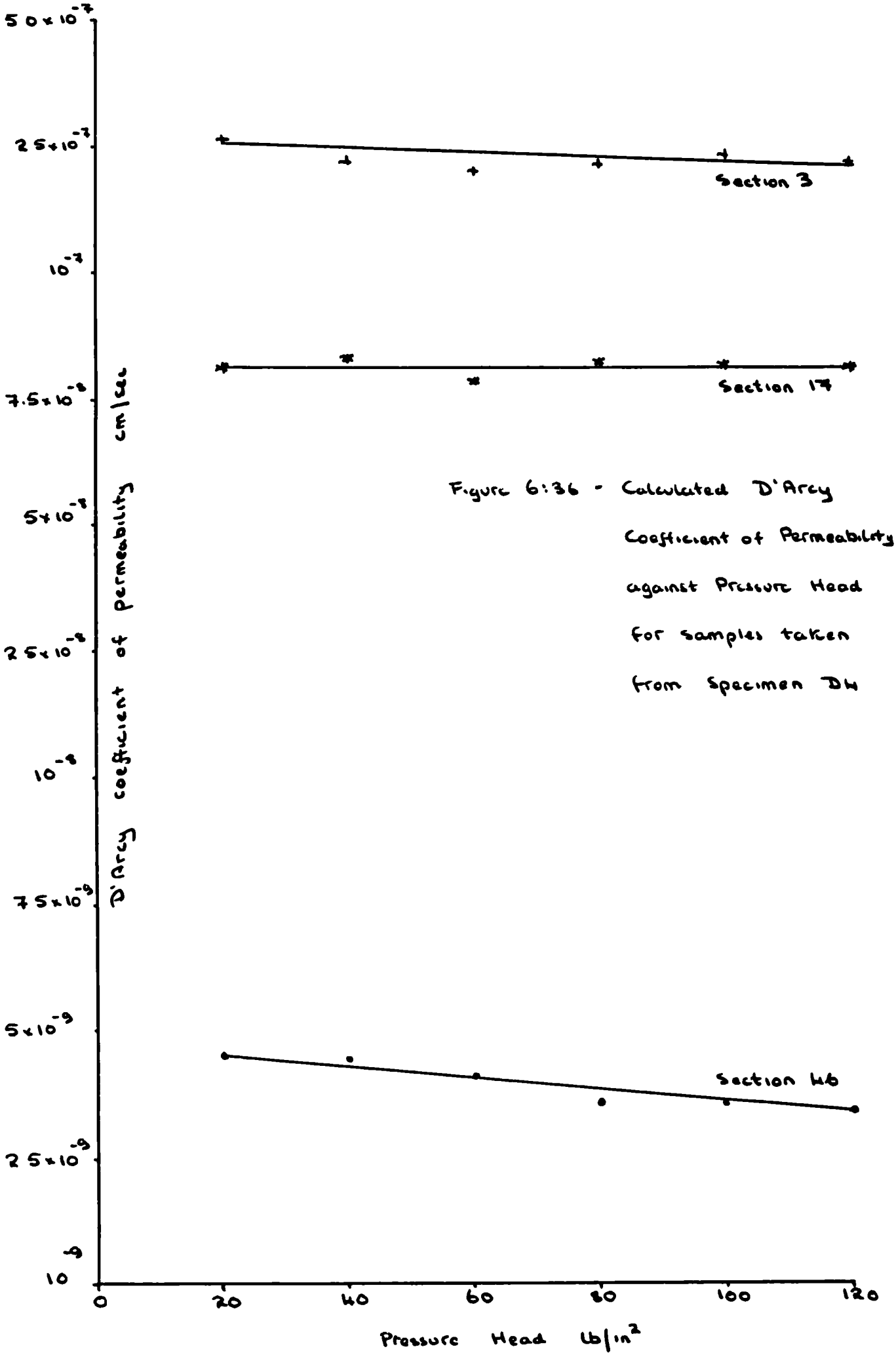


Figure 6:36 - Calculated D'Arcy Coefficient of Permeability against Pressure Head for samples taken from Specimen D4

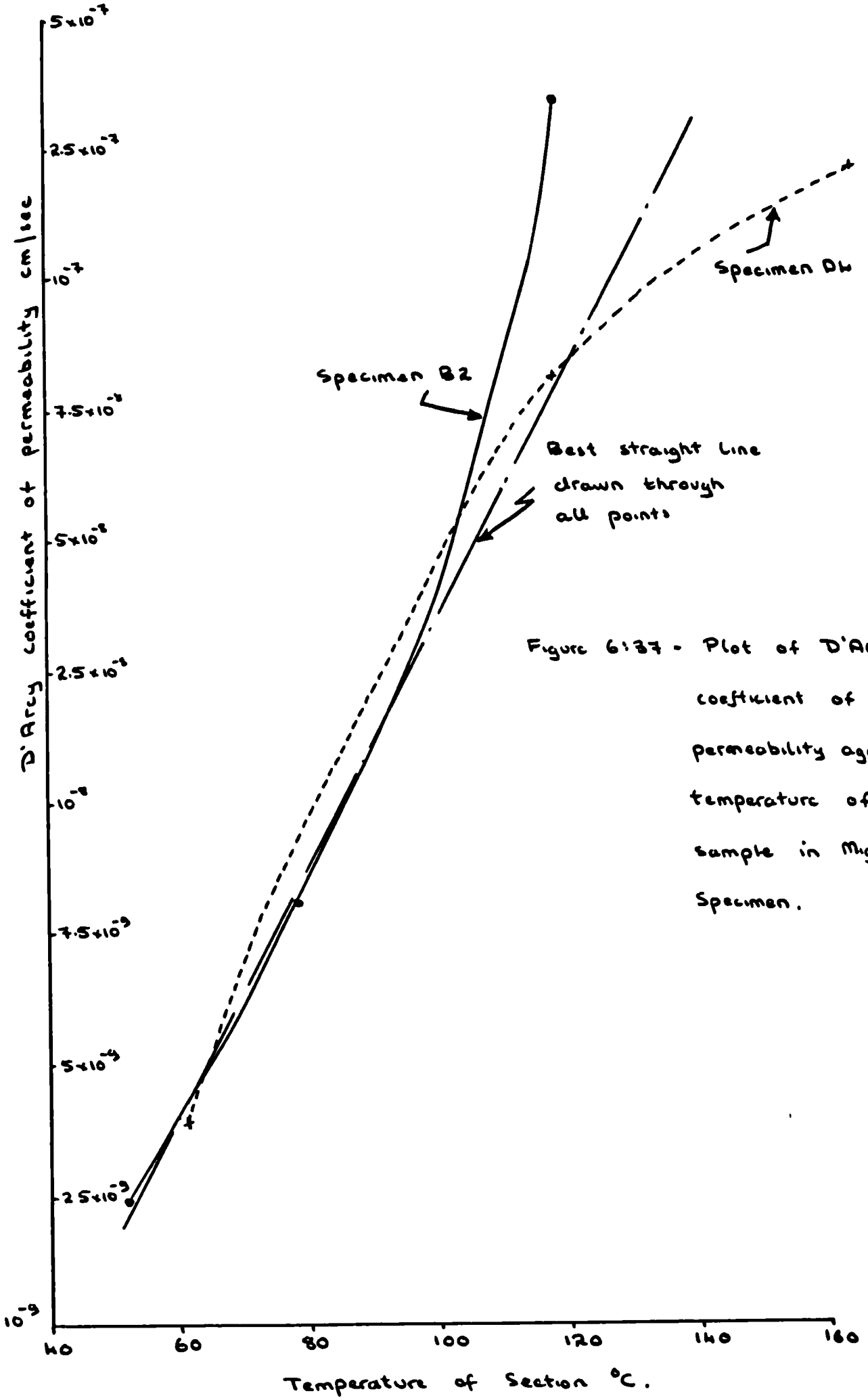
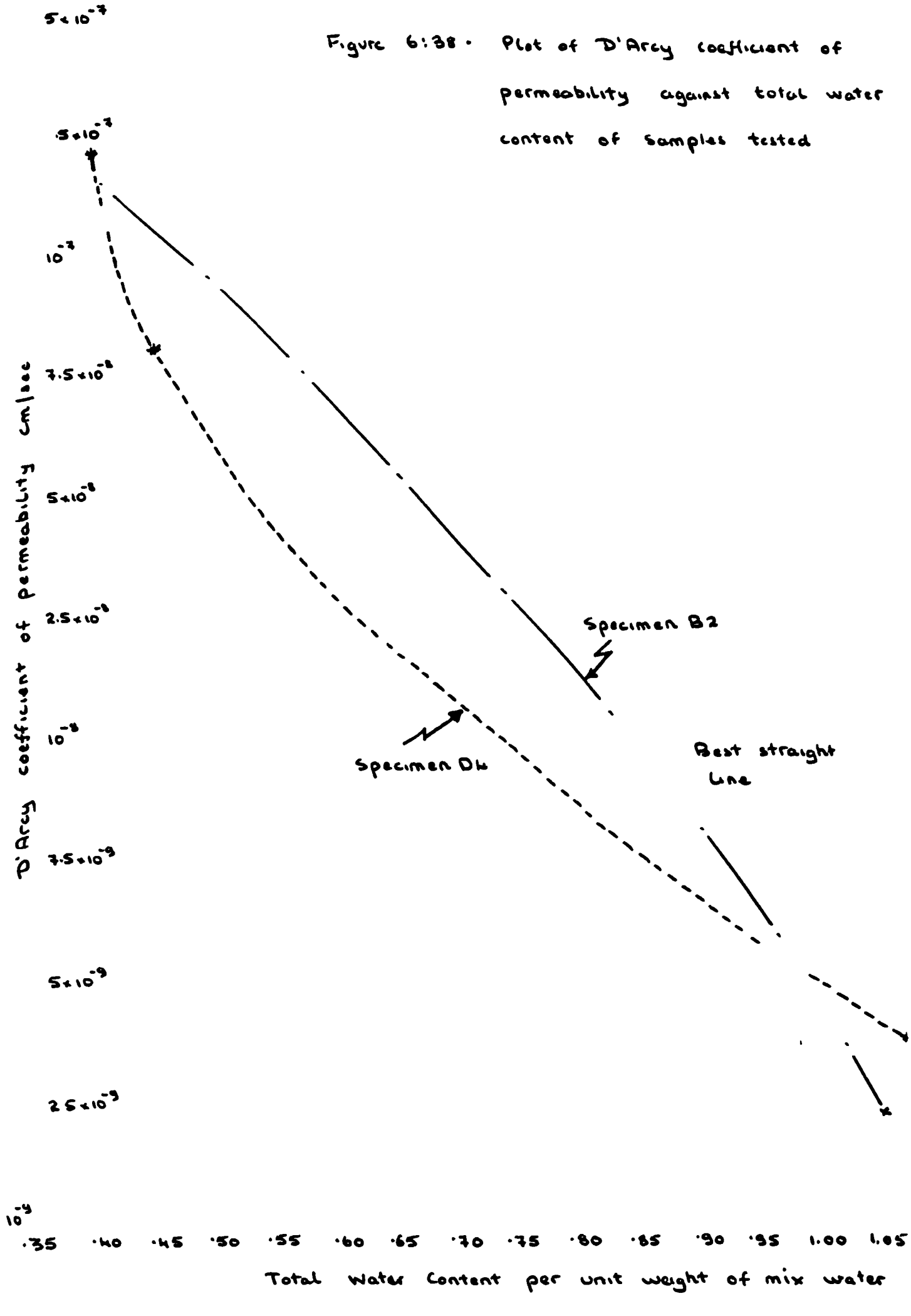


Figure 6:37 - Plot of D'Arcy coefficient of permeability against temperature of sample in Migration Specimen.

Figure 6:38. Plot of D'Arcy coefficient of permeability against total water content of samples tested



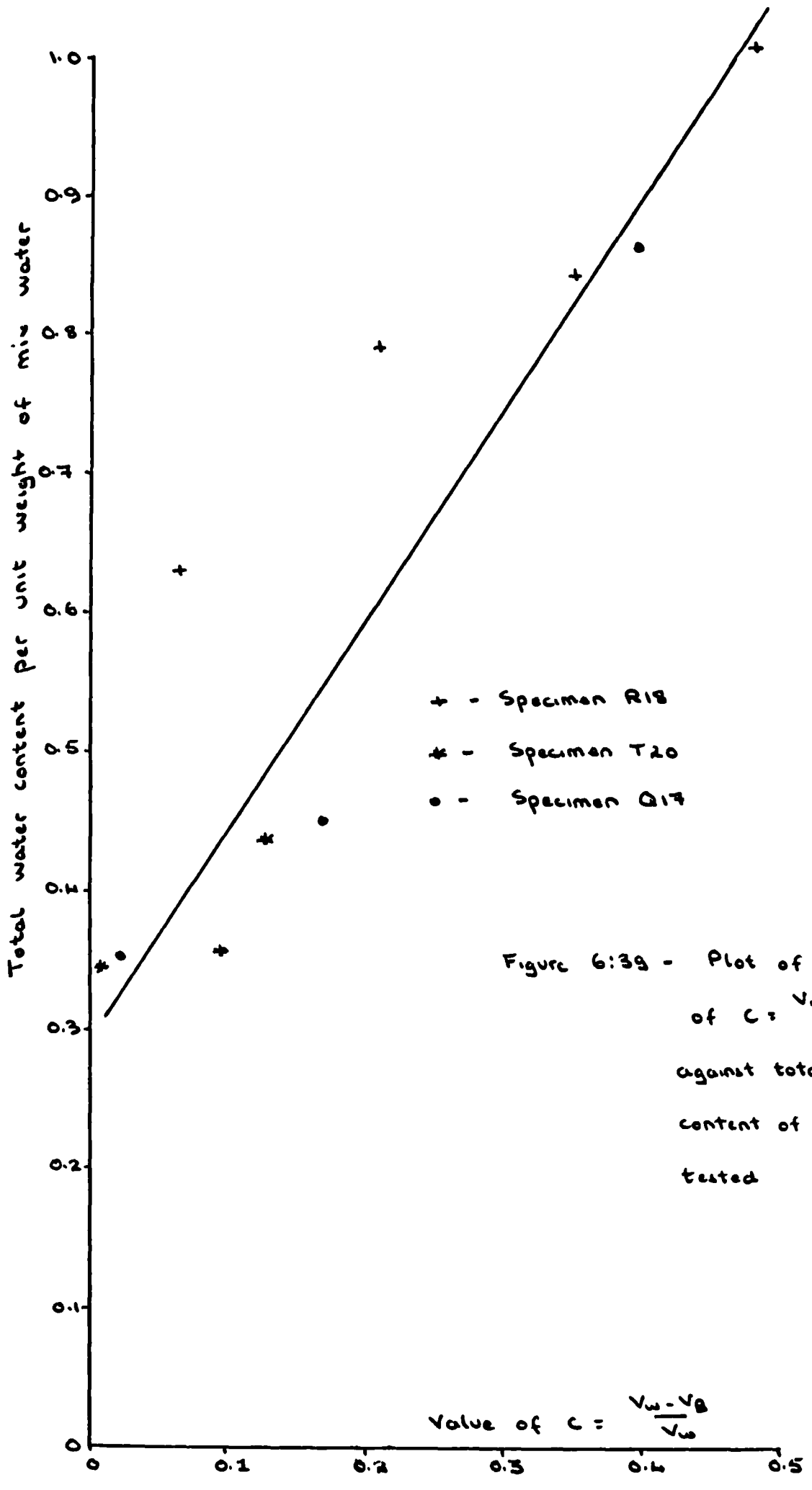


Figure 6:39 - Plot of the value of $C = \frac{V_w - V_B}{V_w}$ against total water content of samples tested

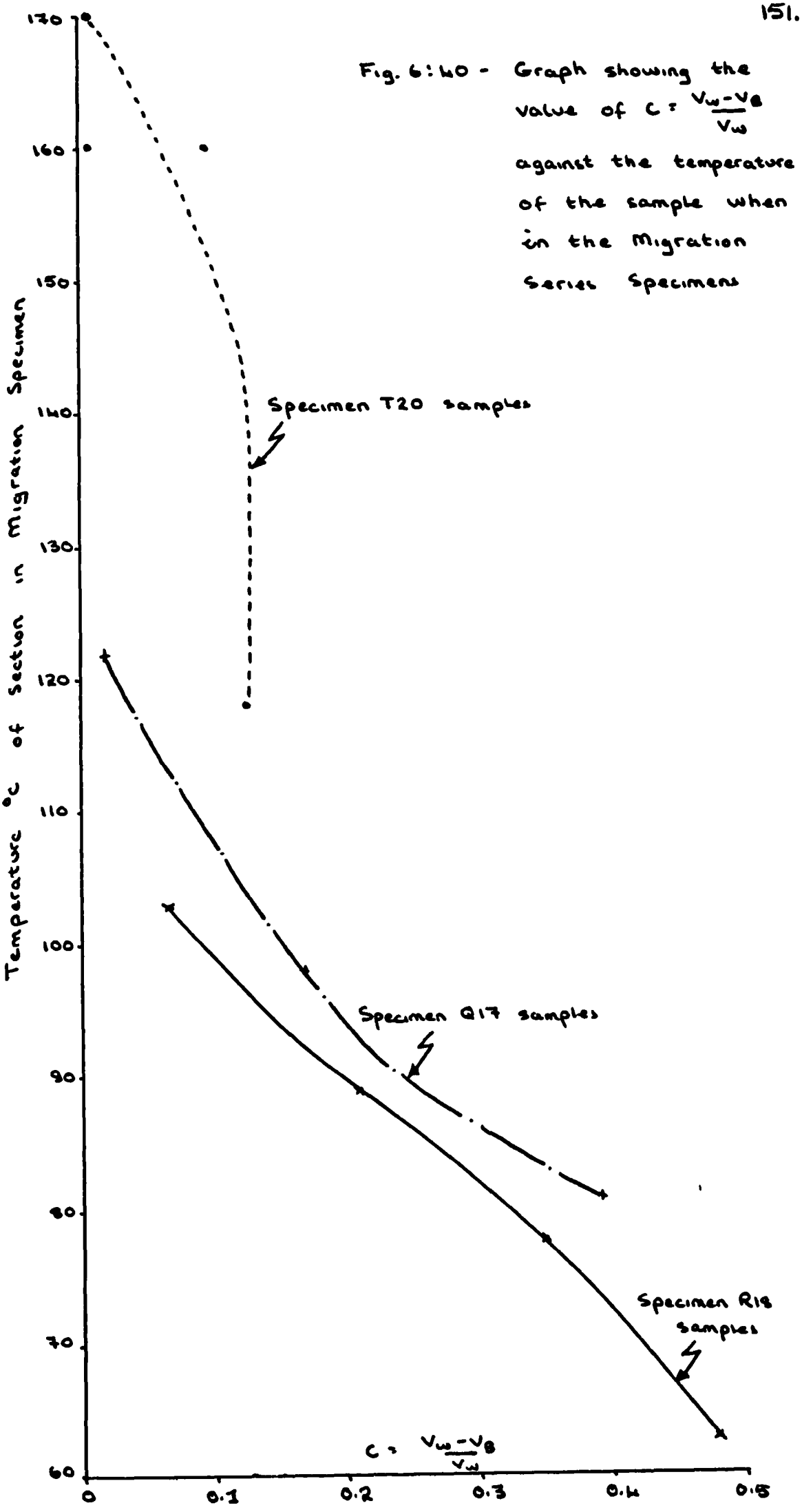


Fig. 6:40 - Graph showing the value of $C = \frac{V_w - V_s}{V_w}$ against the temperature of the sample when in the Migration Series Specimens

PLATE VI-1

POLISHED SAMPLE

PLATE VI-2

SECTION 4

PLATE VI-3

SECTION 12

PLATE VI - 4

SECTION 20

PLATE VI - 5

SECTION 31

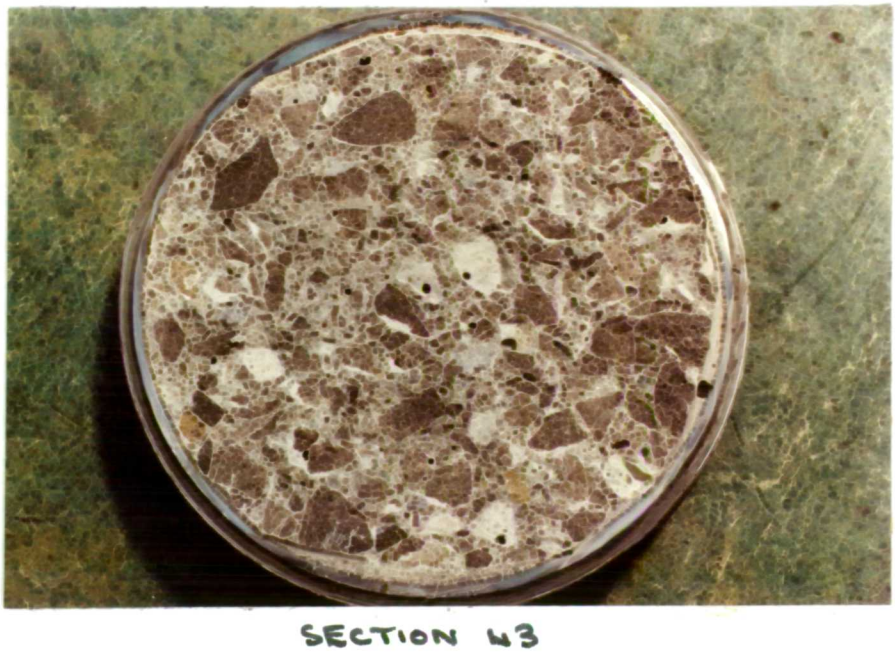


PLATE VI - 6

SECTION 43

APPENDIX II - RESULTS OF MIGRATION SERIES TEST SPECIMENS

FIGURES FOR APPENDIX II.

PHOTOGRAPHS FOR APPENDIX II.

Sections are numbered from the base of the specimen upwards. Section number one is the first inch of concrete from the heated base, and section number sixty is the last inch of concrete at the top of the specimen.

Specimen A1 - Base temperature 105°C.

Plate A1·1 - Sample from Sections 5 and 6.

Plate A1.2 - Sample from sections 5 and 6.

Plate A1:3 - Sample from sections 5 and 6.

Plate A1.4 - Sample from Sections 5 and 6.

Plate A1/5 - Sample from sections 18 and 19.

Plate A1:6 - Sample from sections 18 and 19.

Plate A1:7 - Sample from sections 18 and 19

Plate A1:8 - Sample from sections 18 and 19.

Plate A1·9 - Sample from sections 29 and 30.

Plate A1:10 - Sample from sections 29 and 30.

Plate A1:11 - Sample from sections 29 and 30.

Plate A1:12 - Sample from sections 29 and 30

Plate A1:13 - Sample from sections 37 and 38.

Plate A1:14 - Sample from sections 43 and 44.

Plate A1:15 - Sample from sections 53 and 54.

Plate A1:16 - Sample from sections 53 and 54.

Plate A1:17 - Sample from sections 53 and 54.

Specimen B2 - Base temperature 125°C.

Plate B2:1 - Sample from Section 3

Plate B2:2 - Sample from Section 3

Plate B2:3 - Sample from Section 3

Plate B2·4 - Sample from Section 7

Plate B2:5 - Sample from Section 15.

Plate B2.6 - Sample from Section 15.

Plate B2:7 - Sample from Section 25.

Plate B2:8 - Sample from Section 25.

Plate B2:9 - Sample from Sections 35 and 36.

Plate B2:10 - Sample from Sections 35 and 36.

Plate B2:11 - Sample from Sections 35 and 36.

Plate B2·12 - Sample from Sections 48 and 49.

Plate B2:13 - Sample from sections 48 and 49.

Plate B2·14 - Sample from sections 48 and 49.

Specimen C3 - Base temperature 150°C.

Plate C3:1 - Sample from section 5

Plate C3:2 - Sample from section 15.

Plate C3:3 - Sample from section 15

Plate C3:4 - Sample from sections 21 and 22

Plate C3:5 - Sample from Sections 21 and 22

Plate C3·6 - Sample from sections 21 and 22

Plate C3 7 - Sample from sections 21 and 22

Plate C3:8 - Sample from sections 31 and 32.

Plate C3:9 - Sample from sections 31 and 32

Plate C3:10 - Sample from sections 31 and 32

Plate C3:11 - Sample from Sections 31 and 32.

Plate C3:12 - Sample from section 49

Plate C3:13 - Sample from Section 49

Plate C3:14 - Sample from Section 49

Plate C3 15 - Sample from Section 49.

Plate C3:16 - Sample from sections 58 and 59

Plate C3:17 - Sample from sections 58 and 59

Plate C3:18 - Sample from sections 58 and 59.

Specimen D4 - Base temperature 175°C.

Plate D4·1 - Sample from section 13.

Plate D4 2 - Sample from section 13.

Plate D4:3 - Sample from Section 13.

Plate D4·4 - Sample from section 15.

Plate D4.5 - Sample from Section 15.

Plate D4:6 - Sample from sections 25 and 26.

Plate D4:7 - Sample from sections 25 and 26.

Plate D4·8 - Sample from sections 25 and 26.

Plate D4:9 - Sample from sections 25 and 26.

Plate D4 10 - Sample from sections 25 and 26.

Plate D4·11 - Sample from sections 28 and 29.

Plate D4.12 - Sample from sections 28 and 29.

Plate D4:13 - Sample from sections 35 and 36.

Plate D4.14 - Sample from sections 35 and 36.

Plate D4:15 - Sample from sections 45 and 46.

Plate D4:16 - Sample from sections 45 and 46.

Plate D4:17 - Sample from sections 53 and 54.

Plate D4:18 - Sample from sections 53 and 54.

Specimen E5 - Base temperature 200°C.

Plate E5:1 - Sample from sections 9, 10 and 11.

Plate E5 2 - Sample from sections 9, 10 and 11.

Plate E5·3 - Sample from sections 18 and 19.

Plate E5 4 - Sample from sections 18 and 19.

Plate E5 5 - Sample from sections 18 and 19.

Plate E5·6 - Sample from sections 26, 27 and 28.

Plate E5.7 - Sample from sections 30 and 31.

Plate E5:8 - Sample from sections 30 and 31.

Plate E5:9 - Sample from sections 30 and 31.

Plate E5·10 - Sample from sections 40 and 41.

Plate E5.11 - Sample from sections 40 and 41.

Plate E5·12 - Sample from sections 58 and 59.

Plate E5·13 - Sample from sections 58 and 59.

Plate E5·14 - Sample from sections 58 and 59.

Specimen L.12 - Control Specimen at Laboratory Temperature.

Plate L12·1 - Sample from sections 9 and 10.

Plate L12.2 - Sample from sections 32 and 33.

Plate L12·3 - Sample from sections 32 and 33.

Plate L12:4 - Sample from Section 56.

Plate L12:5 - Sample from section 56.

Plate L12·6 - Sample from section 56.

Specimen M13 - Control specimen at Laboratory Temprature.

Plate M13·1 - Sample from section 32.

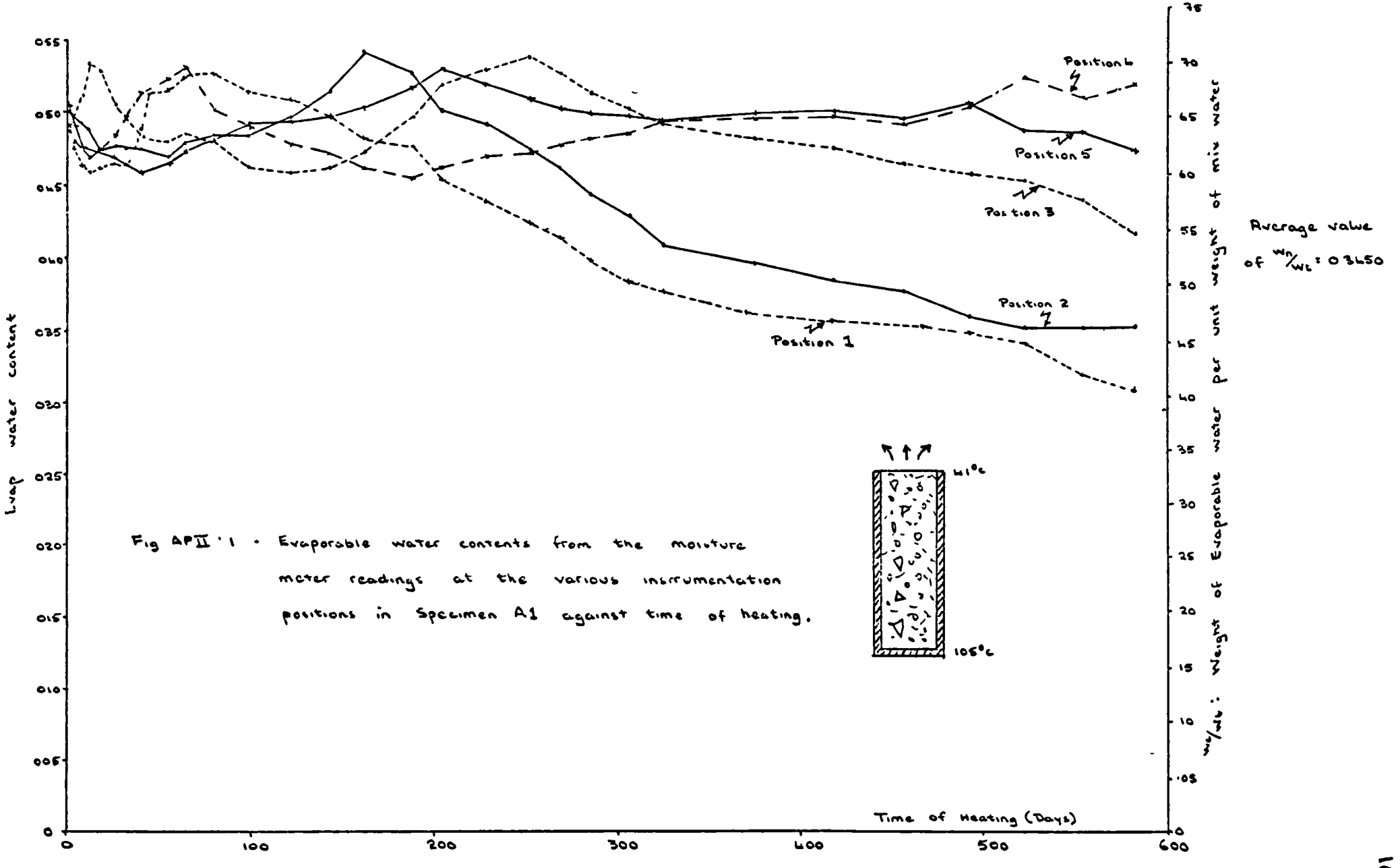


Fig APII·1 · Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen A1 against time of heating.

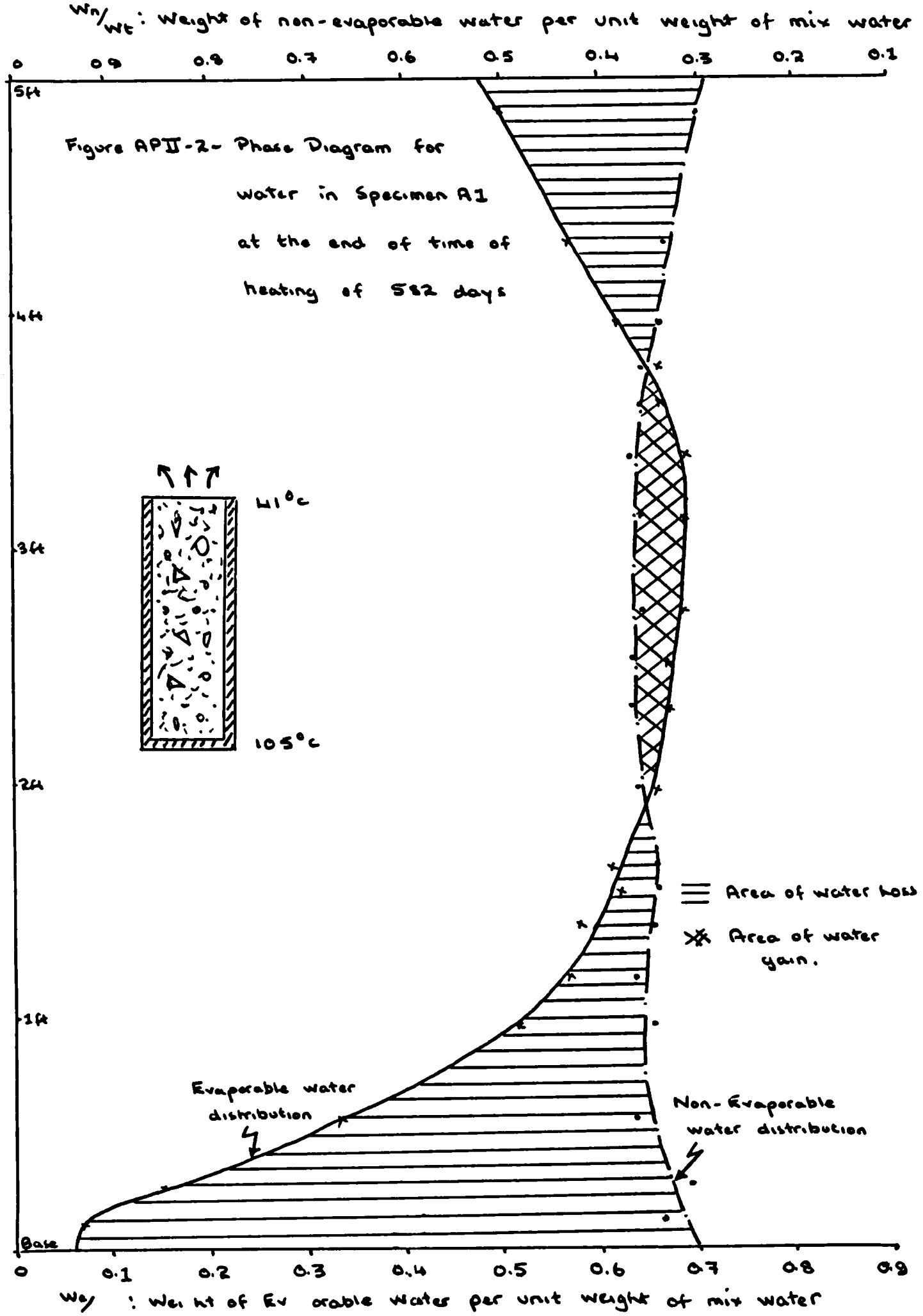


Figure APII-2- Phase Diagram for water in Specimen A1 at the end of time of heating of 582 days

Figure APII : 3 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen A1

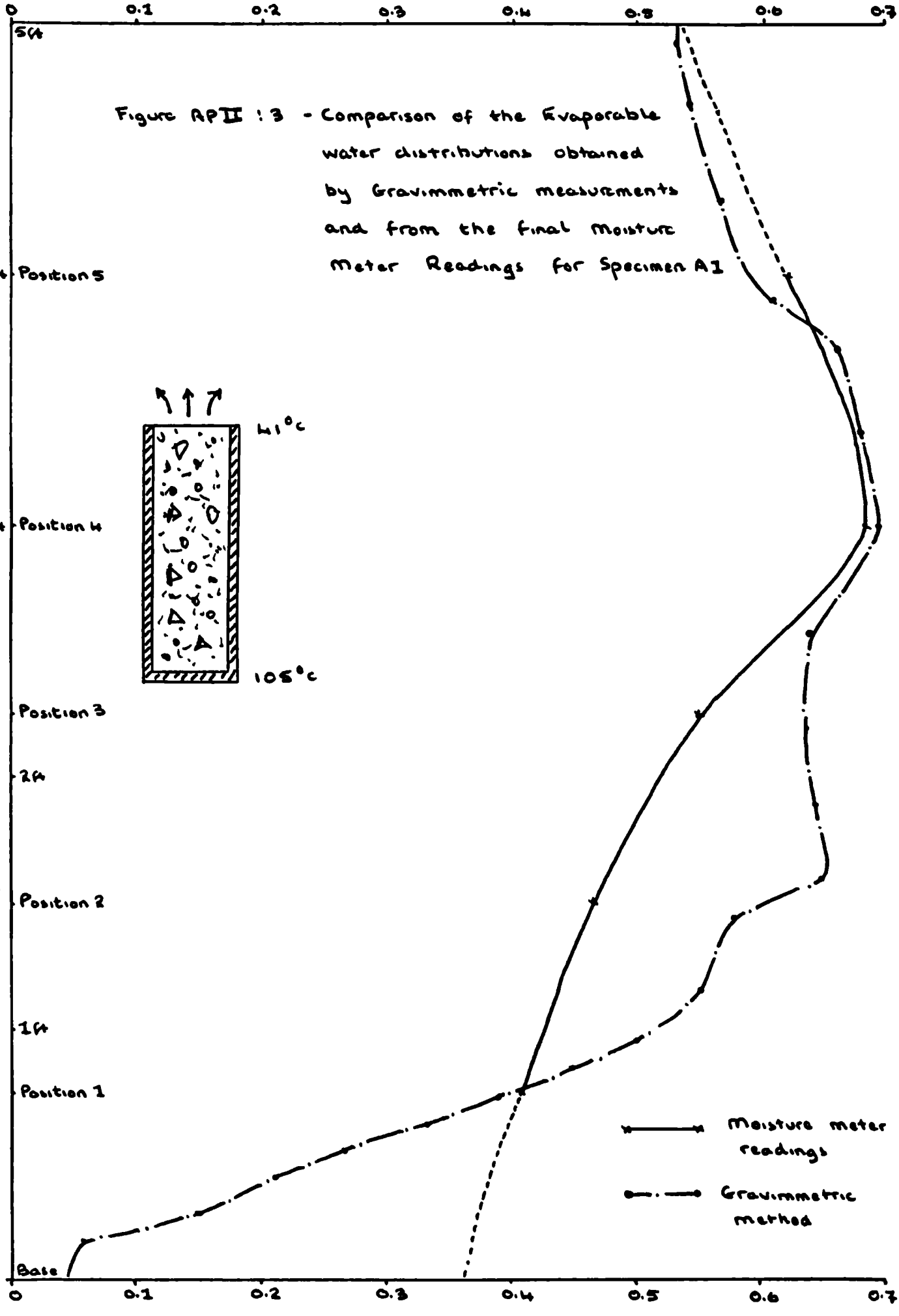


Figure AP II : 4 - Evaporable water distributions for specimen A1 at various times of heating.

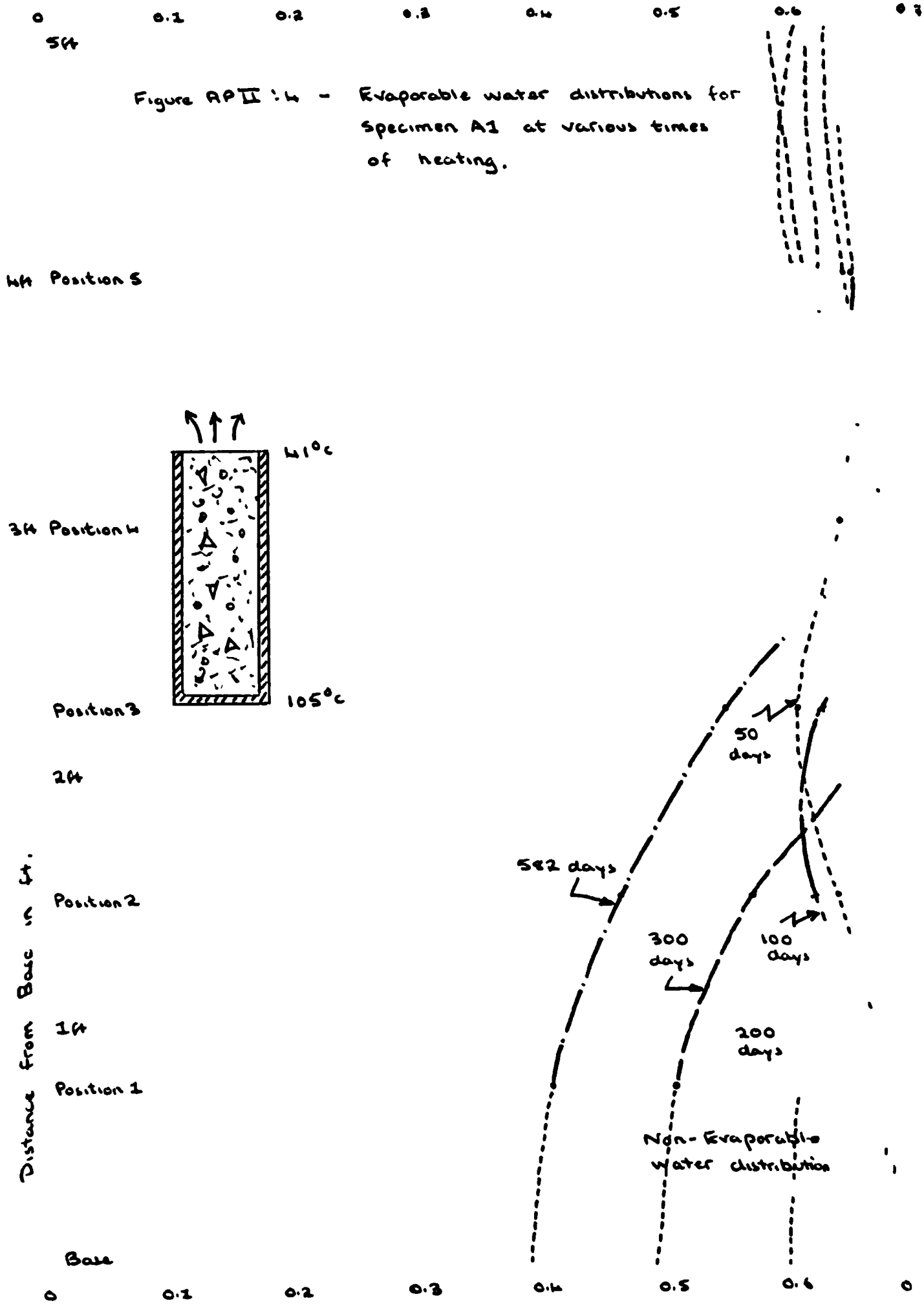


Fig APII:5 - Gauge Pore Pressures at the various instrumentation positions in Specimen A1 against time of heating.

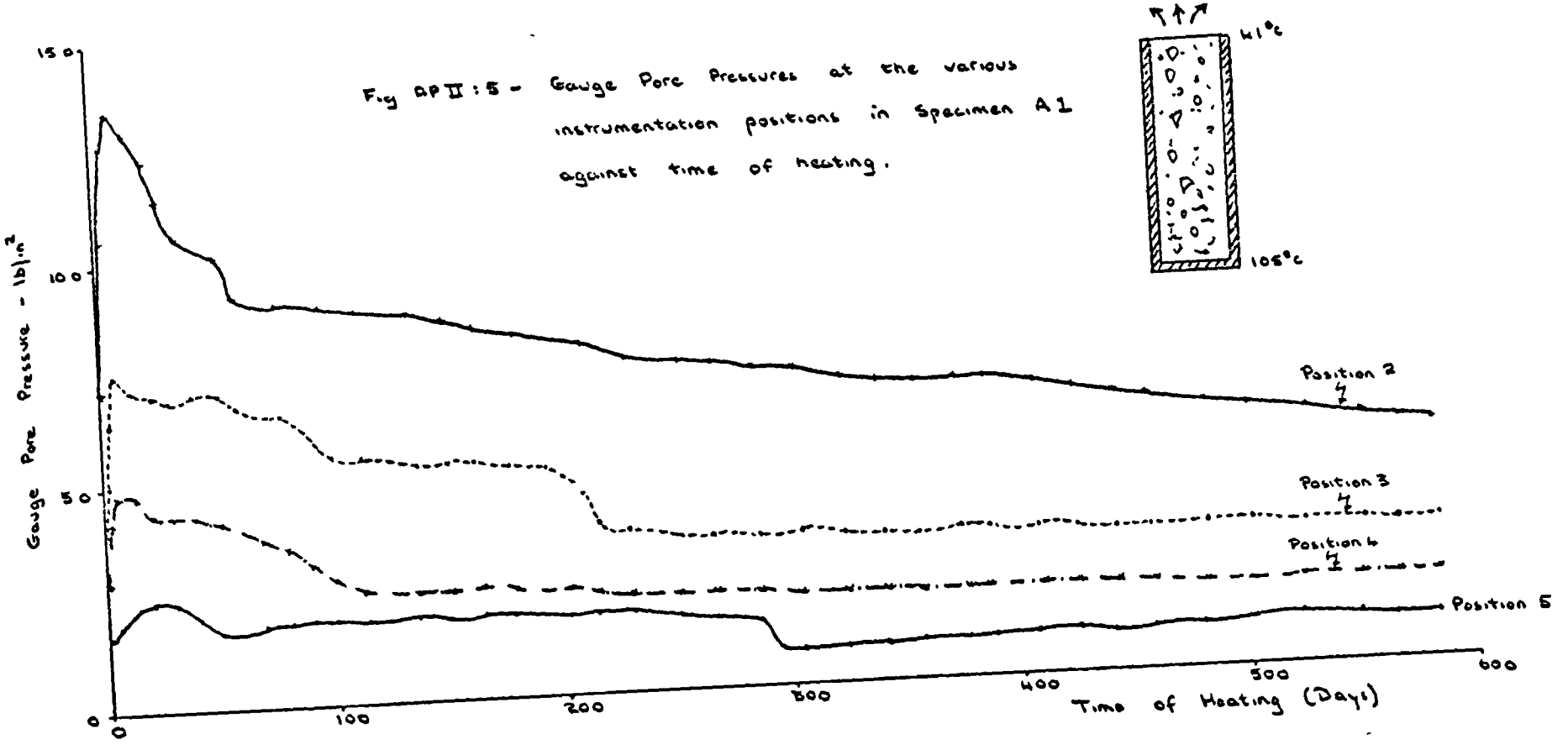
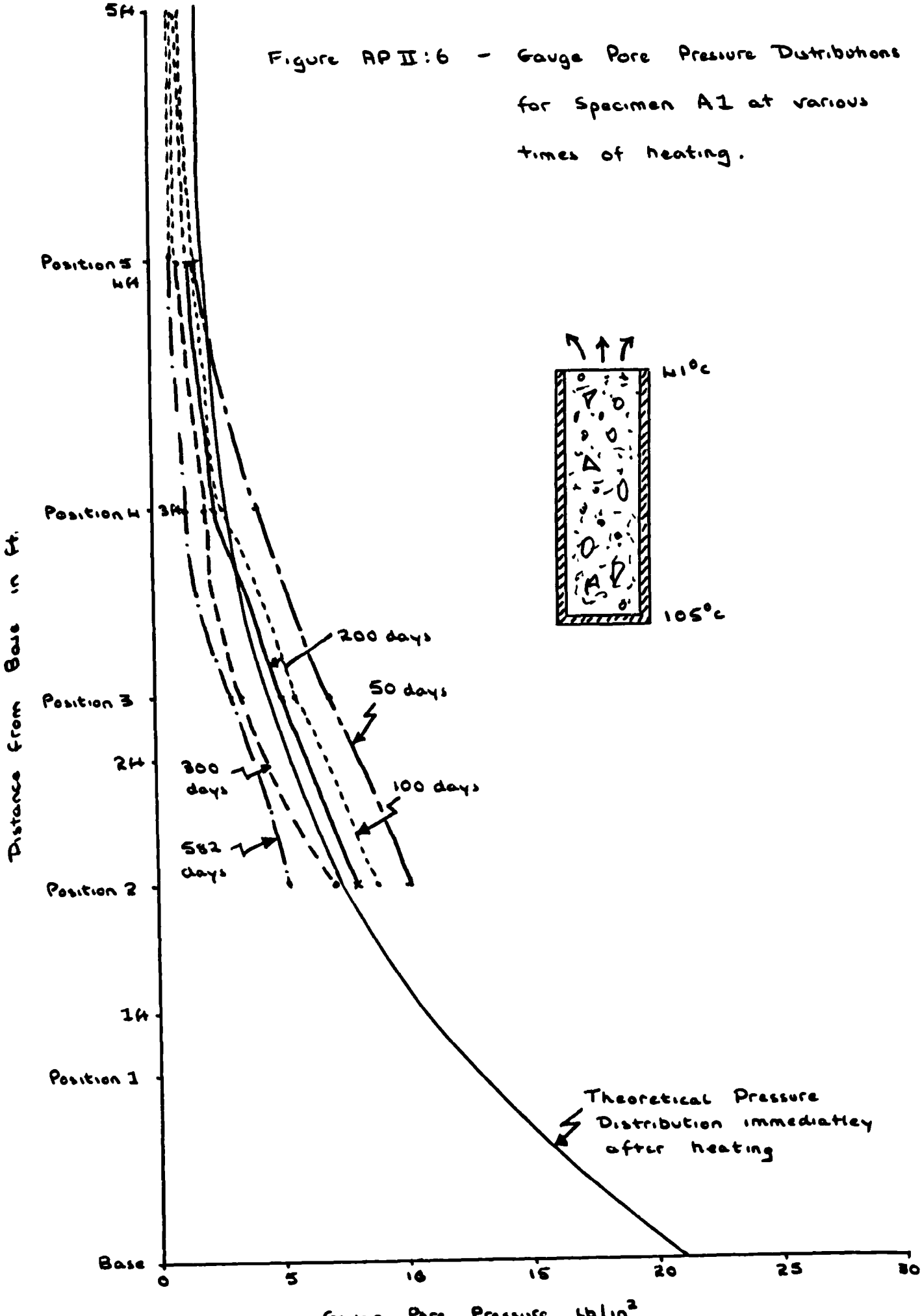


Figure AP II:6 - Gauge Pore Pressure Distributions for Specimen A1 at various times of heating.



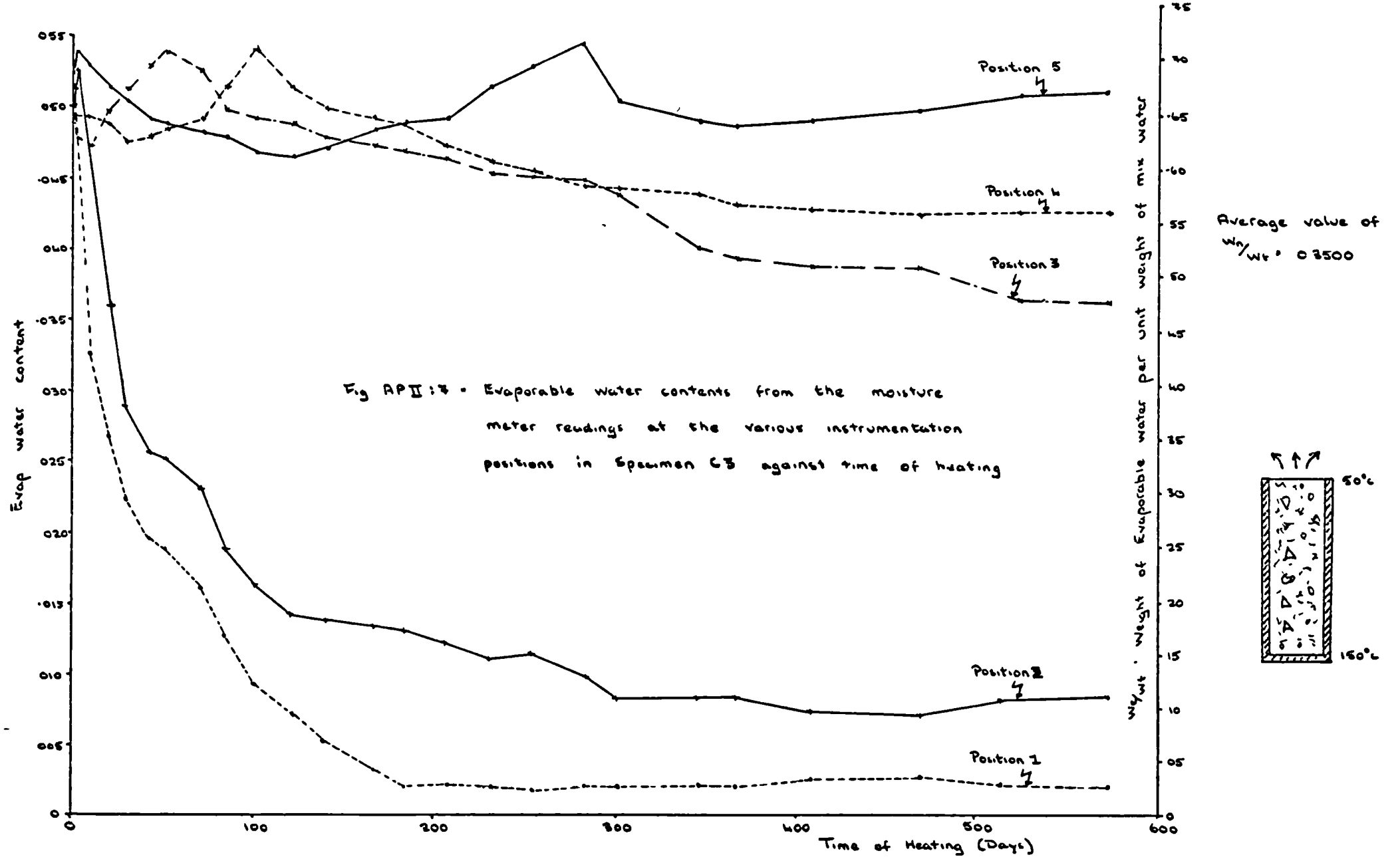


Fig AP II : 4 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen C3 against time of heating

Average value of W_n/W_t = 0·3500

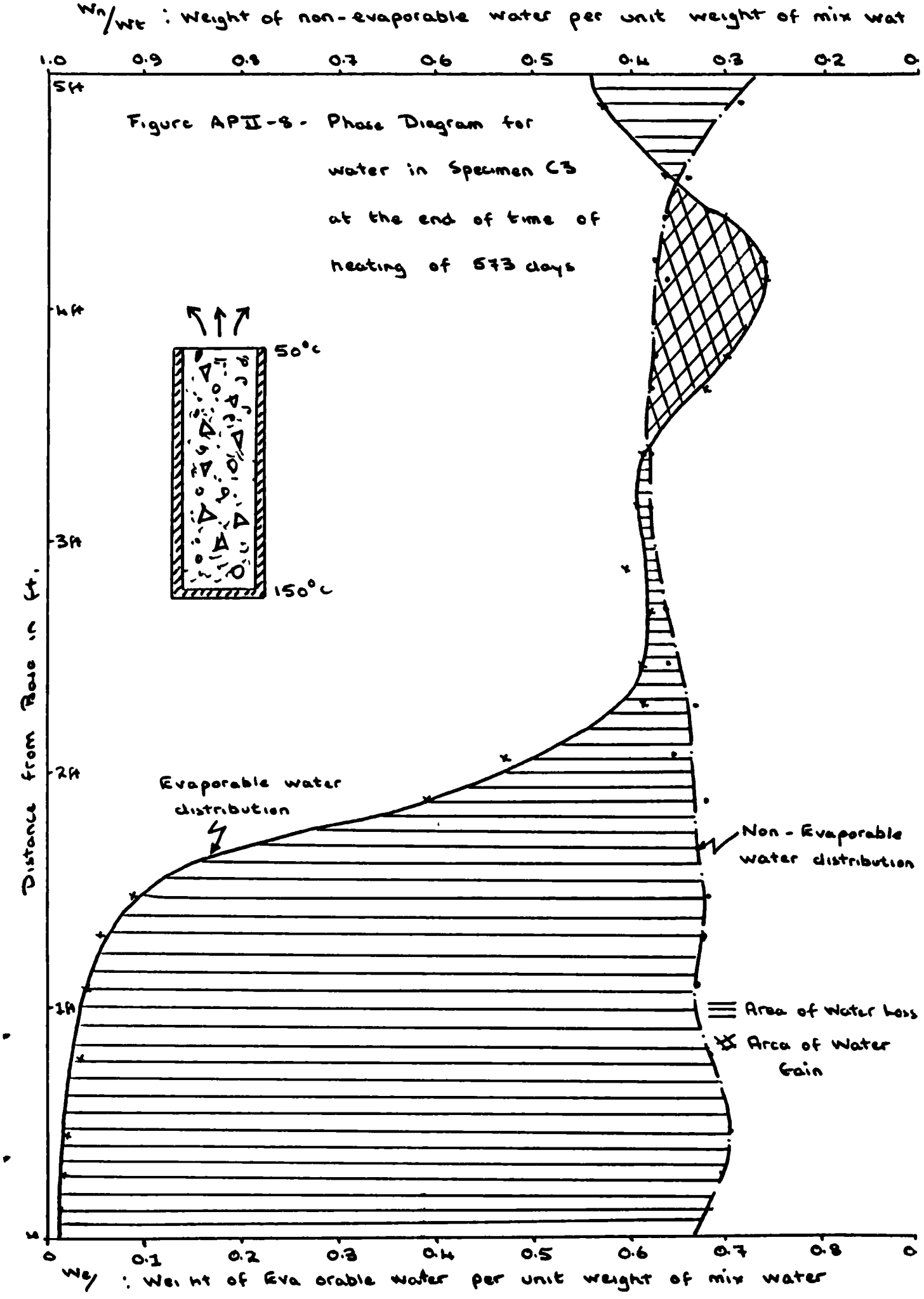


Figure APII-8 - Phase Diagram for water in Specimen C3 at the end of time of heating of 573 days

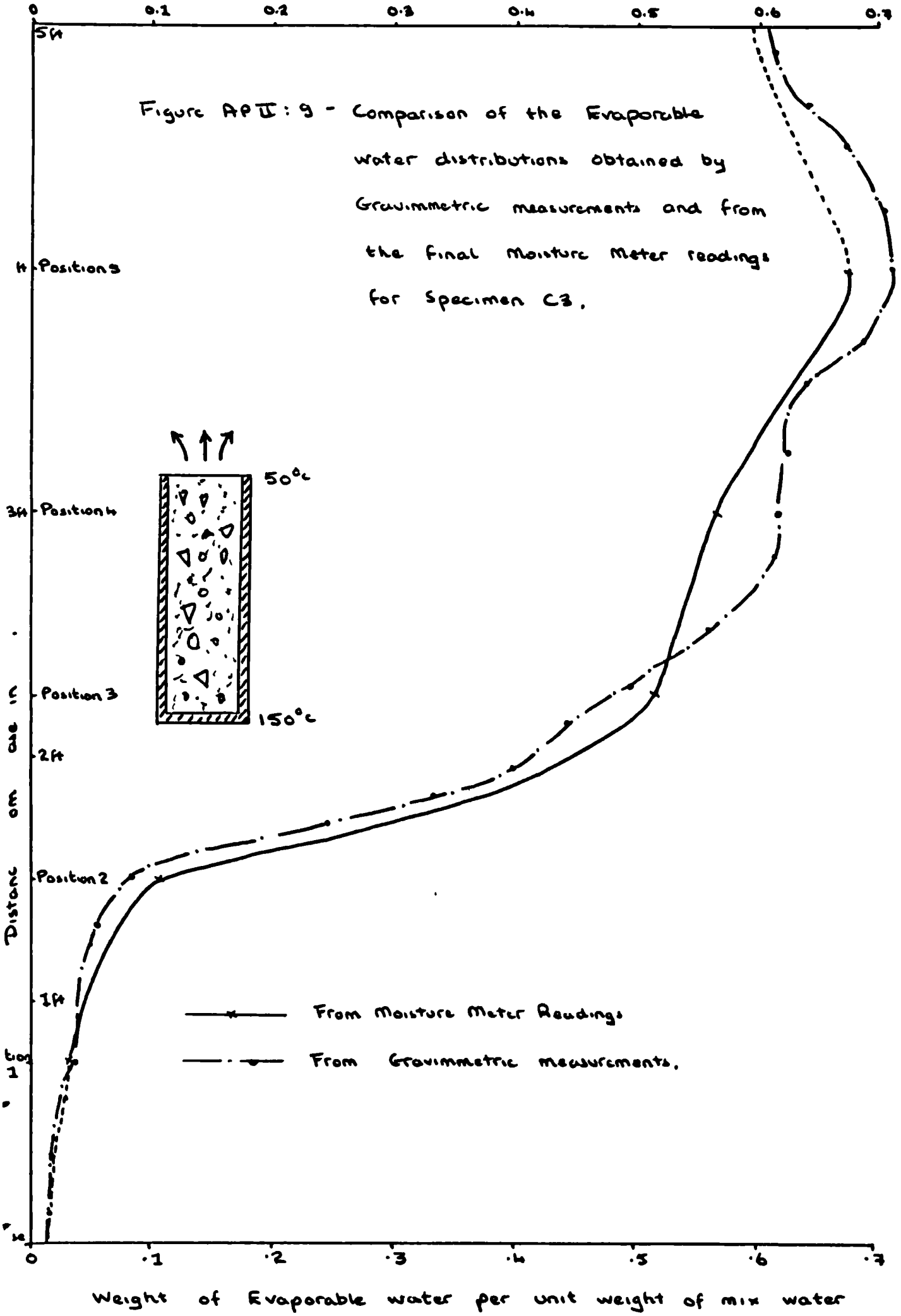


Figure AP II : 9 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for Specimen C3.

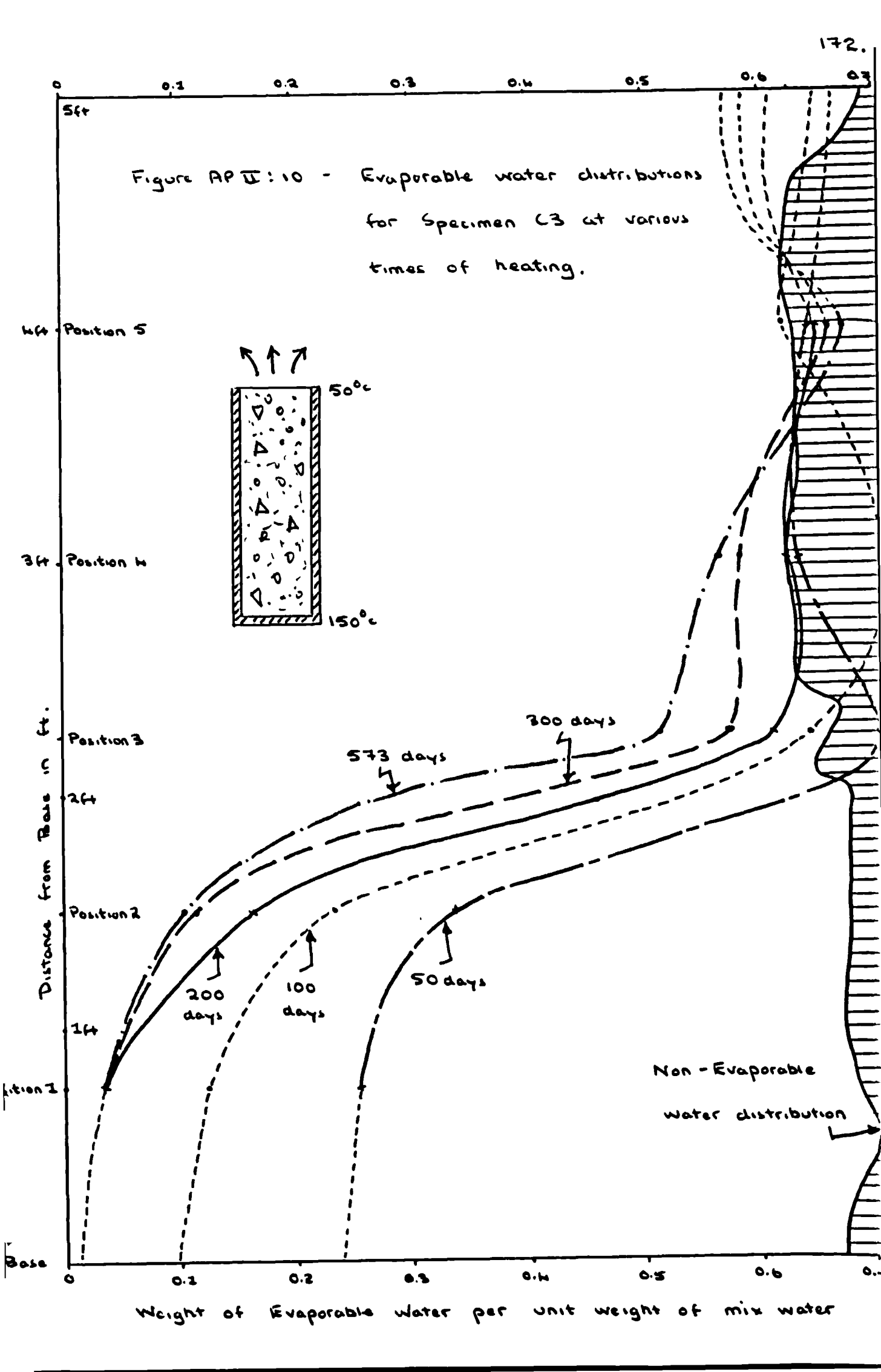


Figure AP II : 10 - Evaporable water distributions for Specimen C3 at various times of heating.

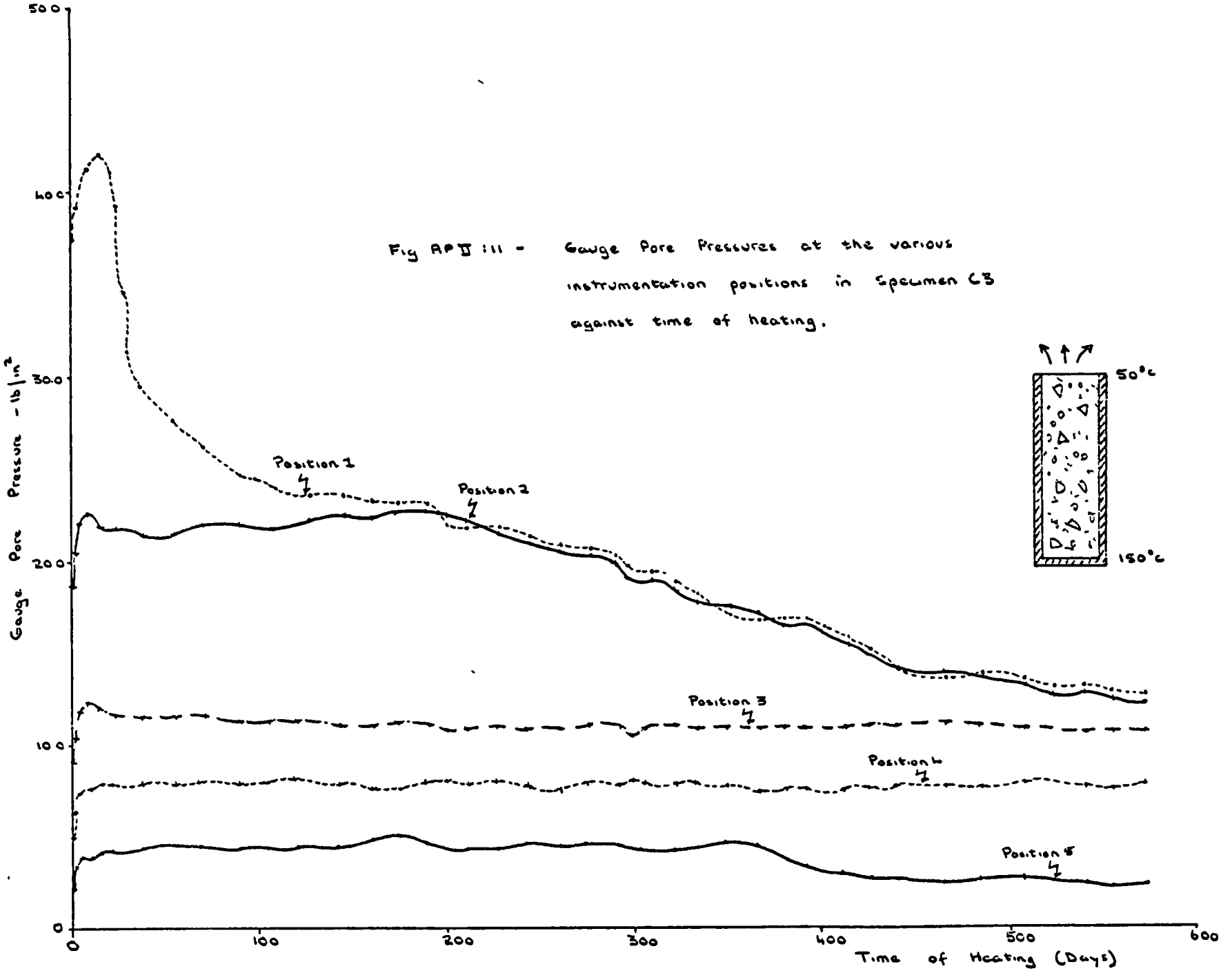
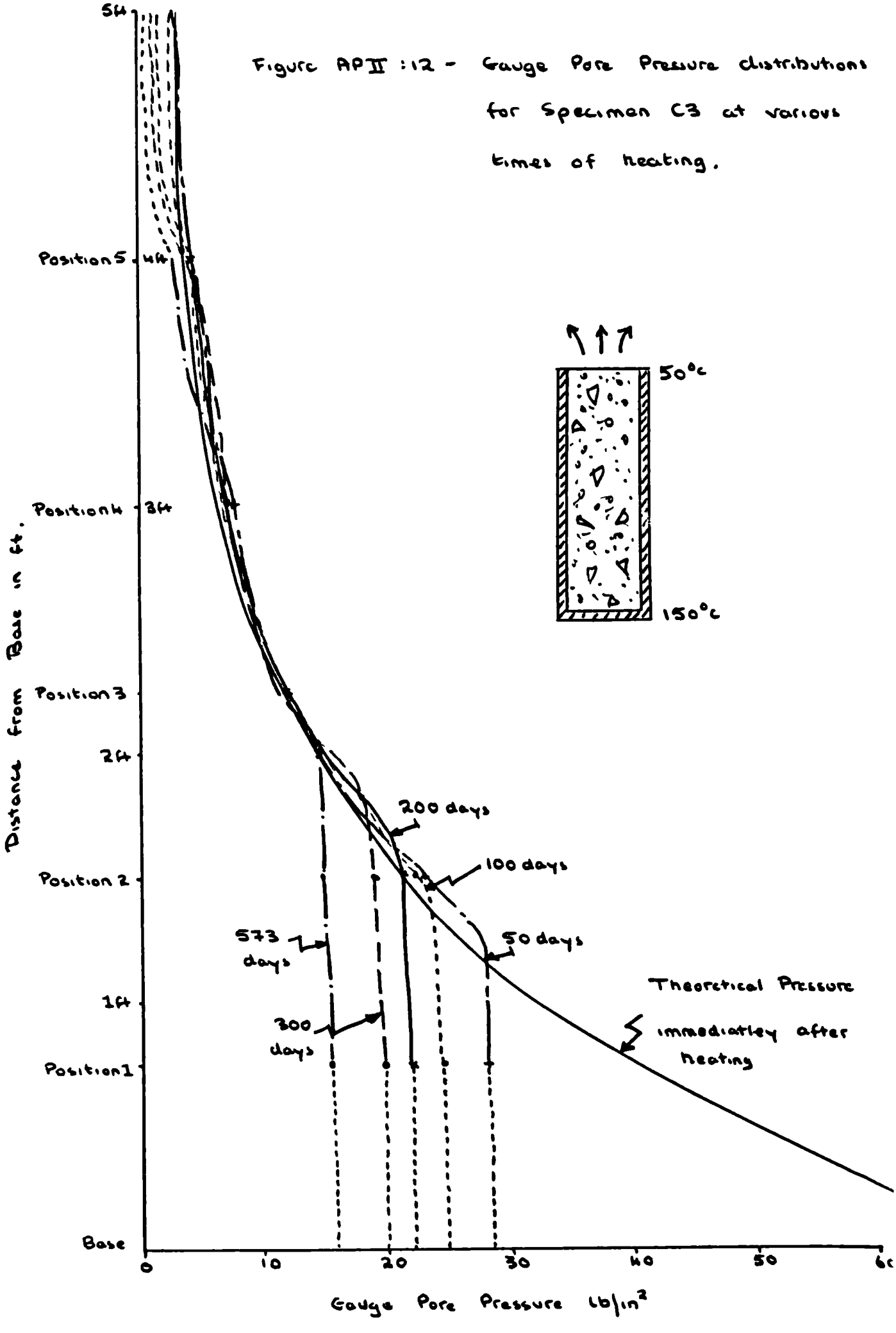


Fig AP II :11 - Gauge Pore Pressures at the various instrumentation positions in Specimen C3 against time of heating.

Figure APII :12 - Gauge Pore Pressure distributions for Specimen C3 at various times of heating.



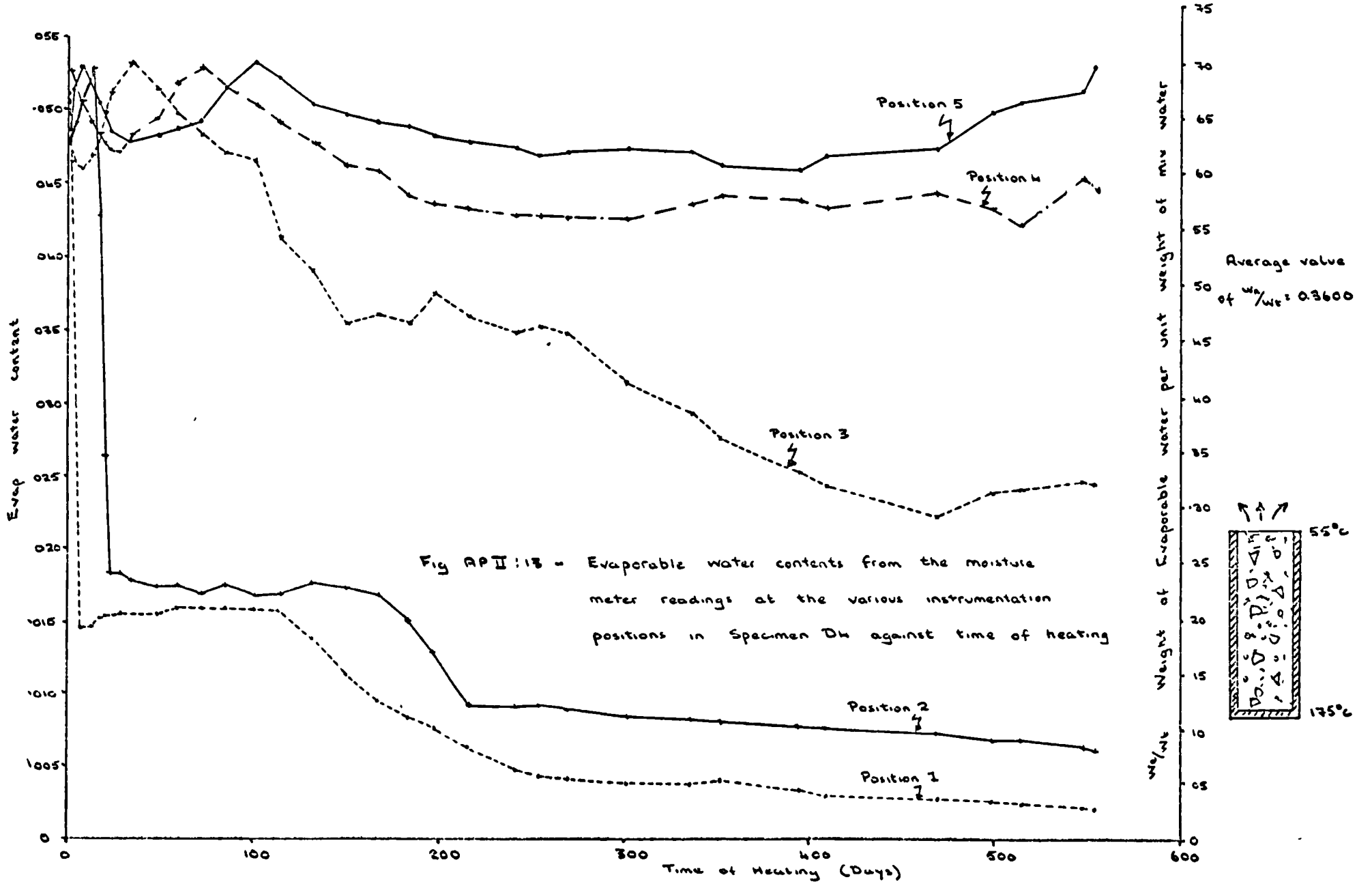


Fig APII:13 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen D4 against time of heating

W_n/W_t : Weight of Non-Evaporable water per unit weight of mix water

1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1

5H

4H

3H

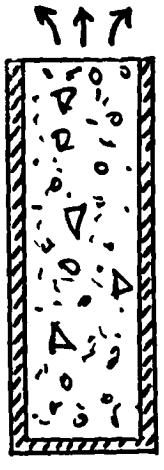
2H

1H

0

Distance from Base - ft.

Figure APII-14 - Phase Diagram for water in Specimen D4 at the end of time of heating of 554 days.



Evaporable water distribution

Non-Evaporable water distribution

= Area of Water Loss

✳ Area of Water Gain

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

W_e/W_t : Weight of Evaporable water per unit weight of mix water

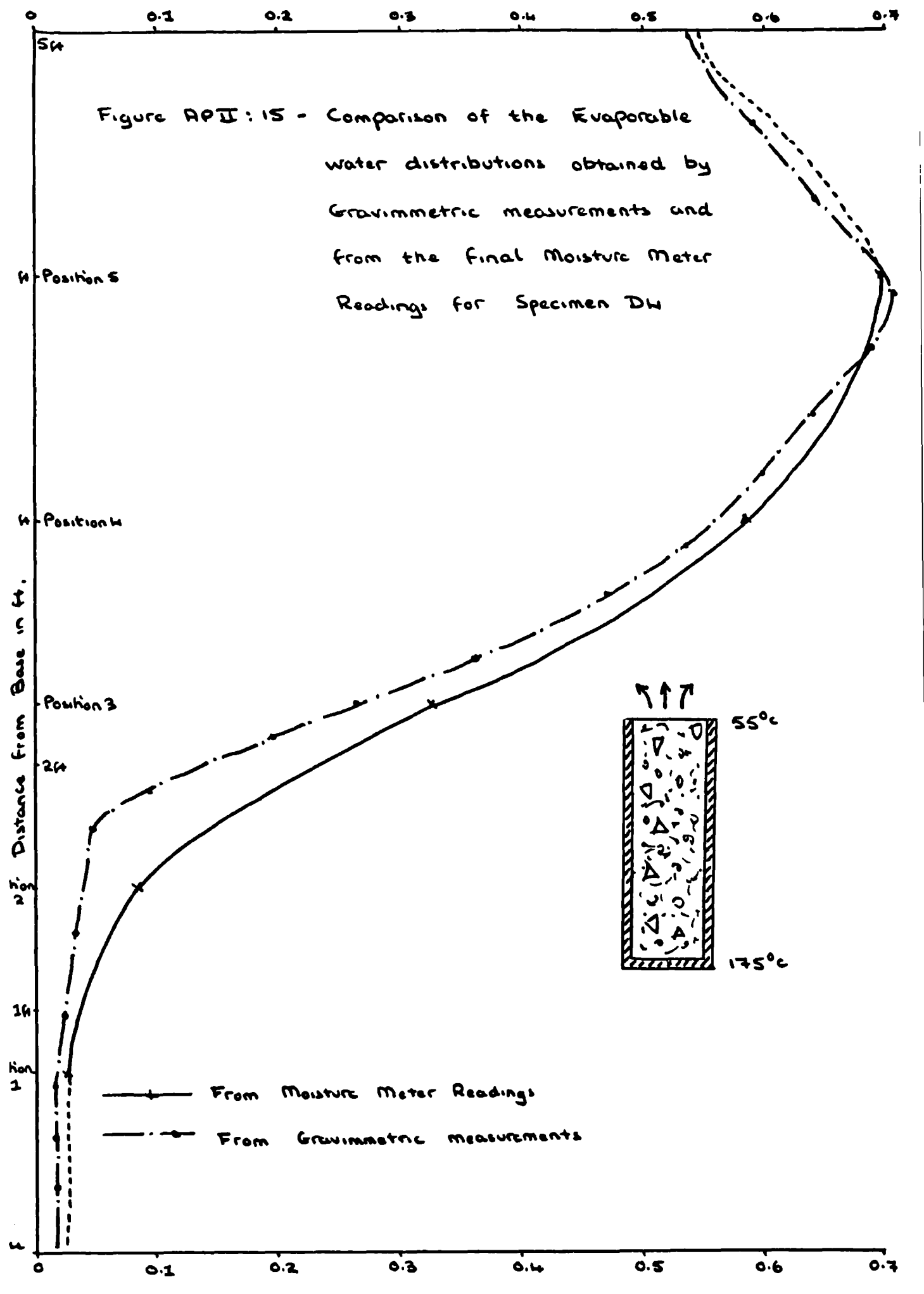


Figure APII : 15 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen DW

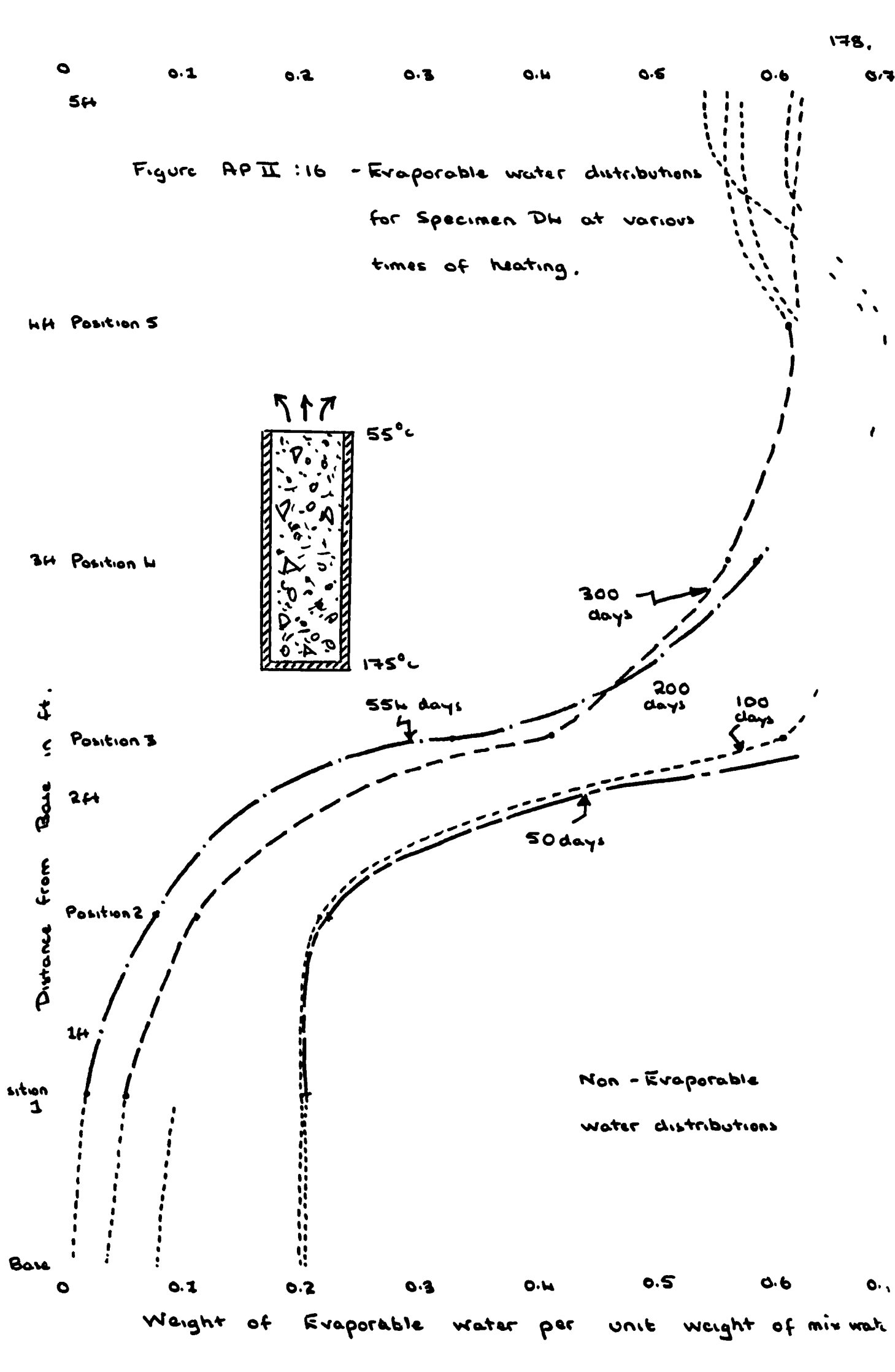


Figure AP II : 16 - Evaporable water distributions for Specimen DH at various times of heating.

Fig AP II · 17 - Gauge Pore Pressures at the various instrumentation positions in Specimen DH against time of heating.

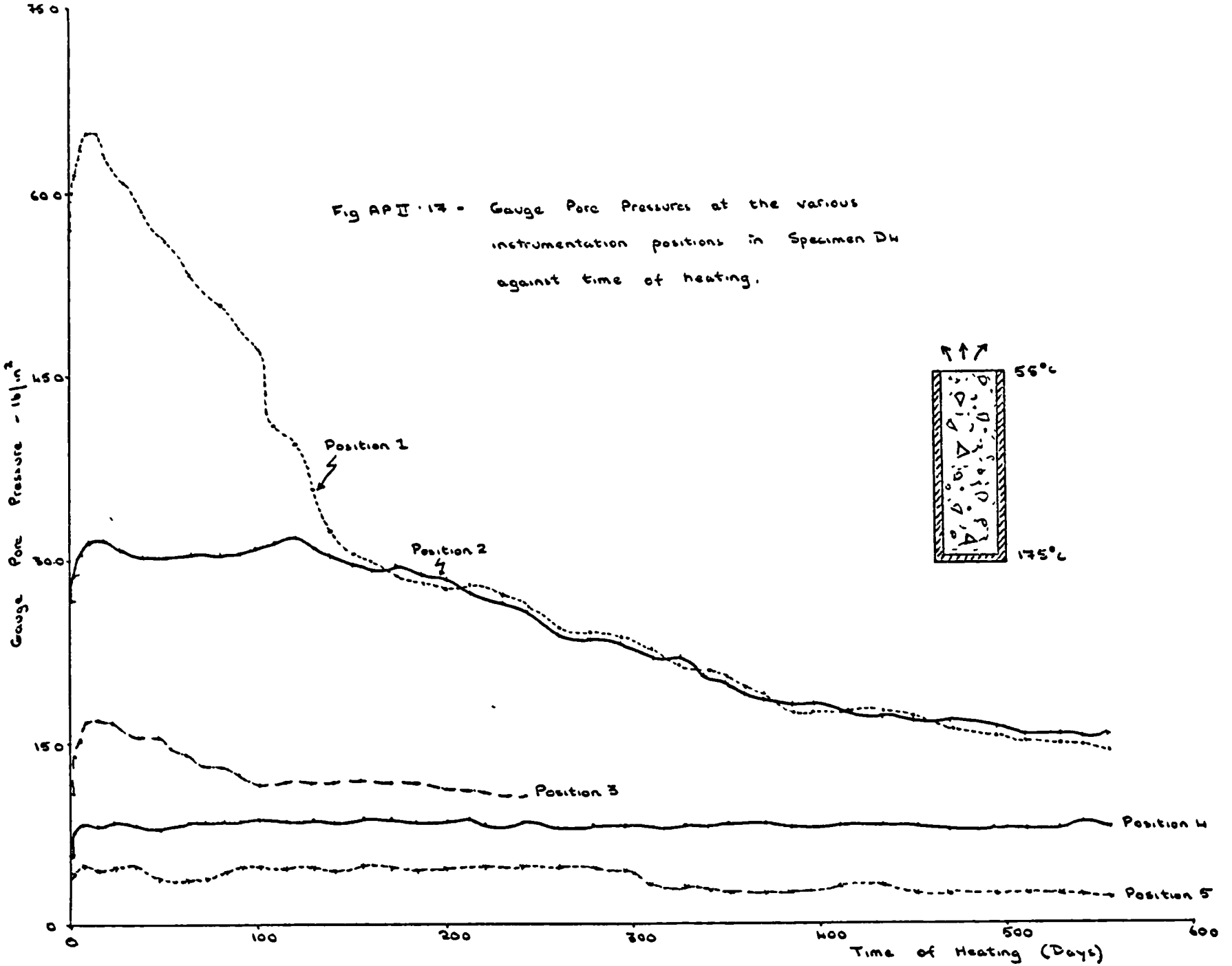
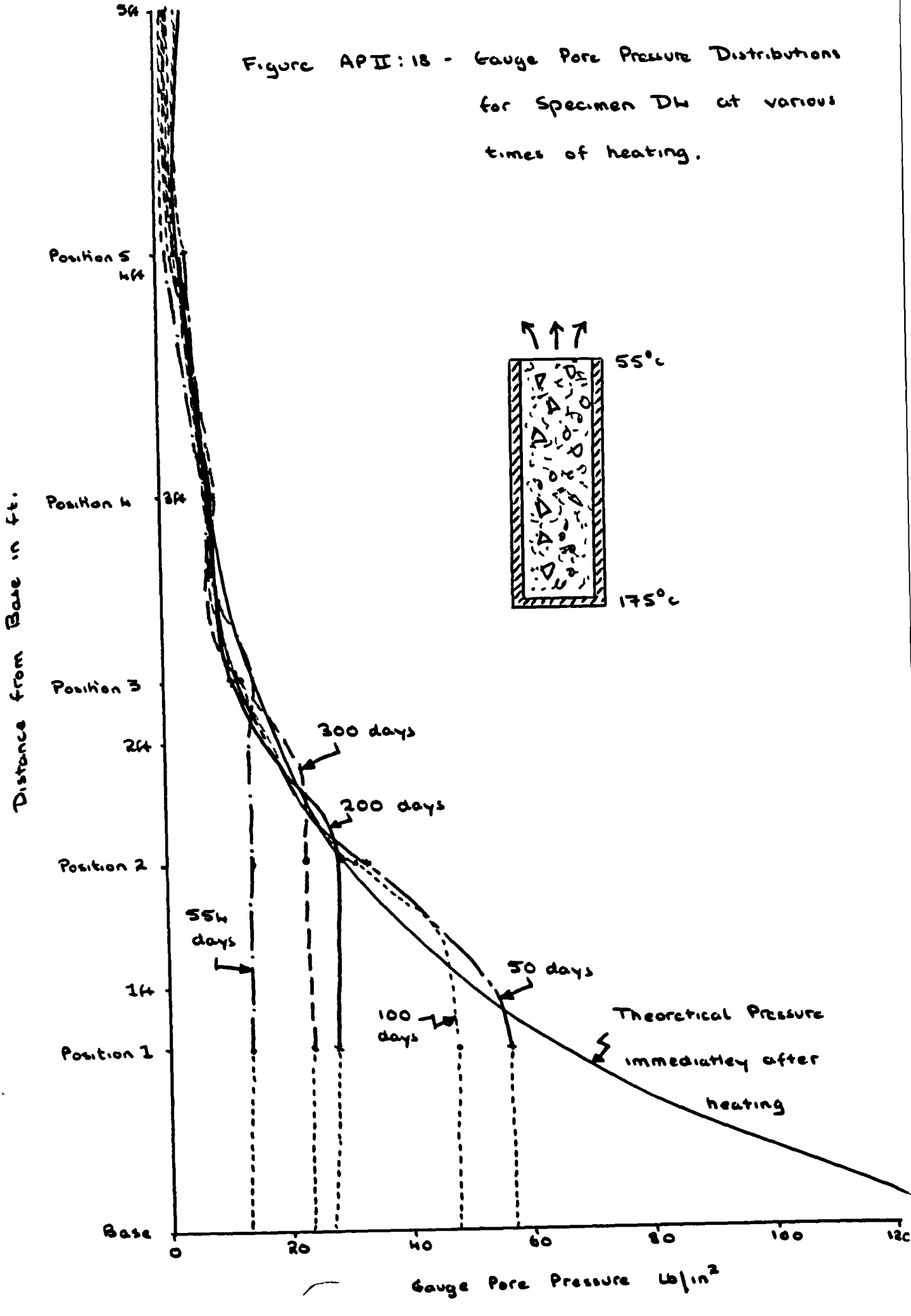


Figure APII:18 - Gauge Pore Pressure Distributions for Specimen DH at various times of heating.



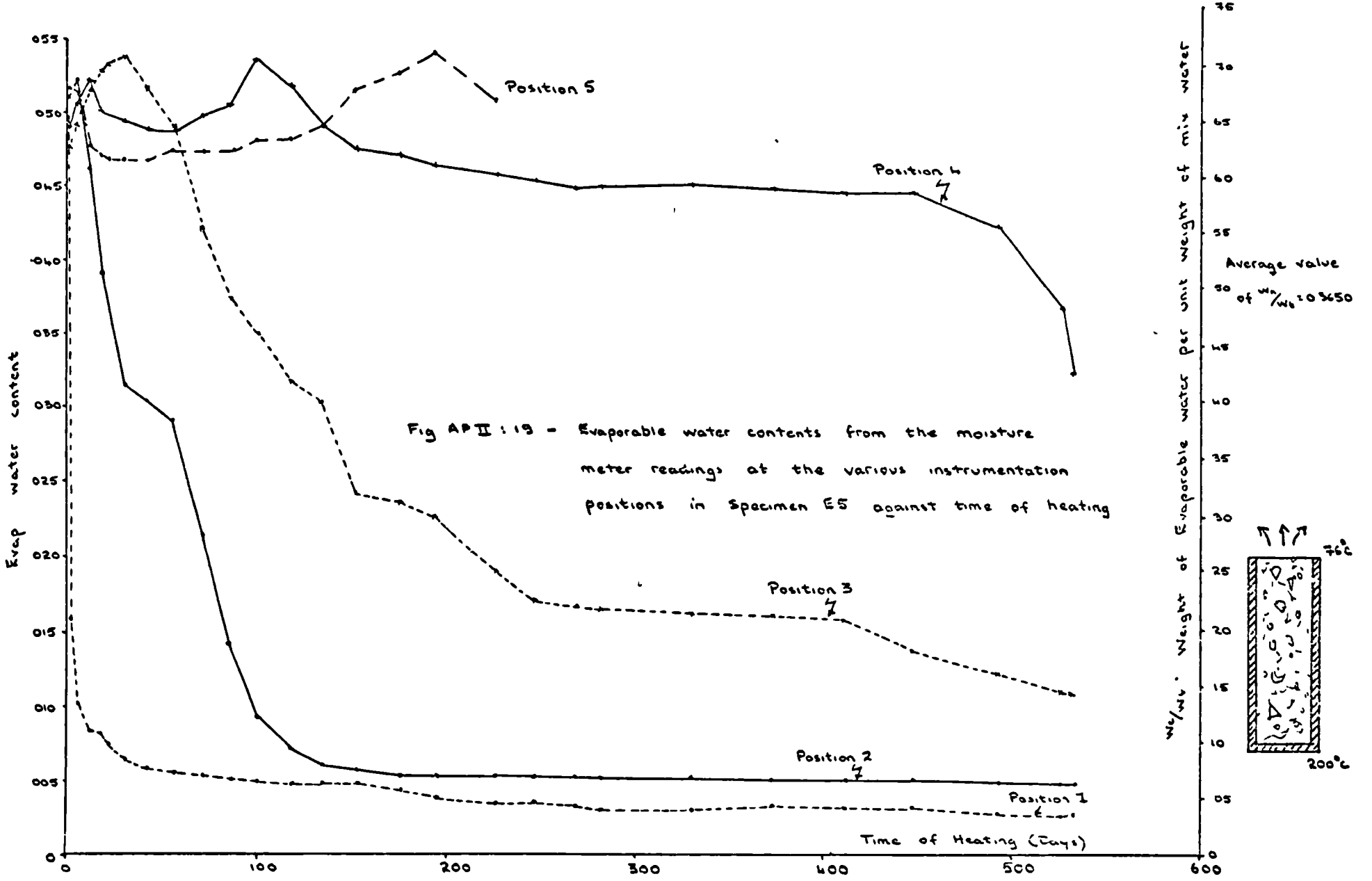


Fig AP II : 19 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen E5 against time of heating

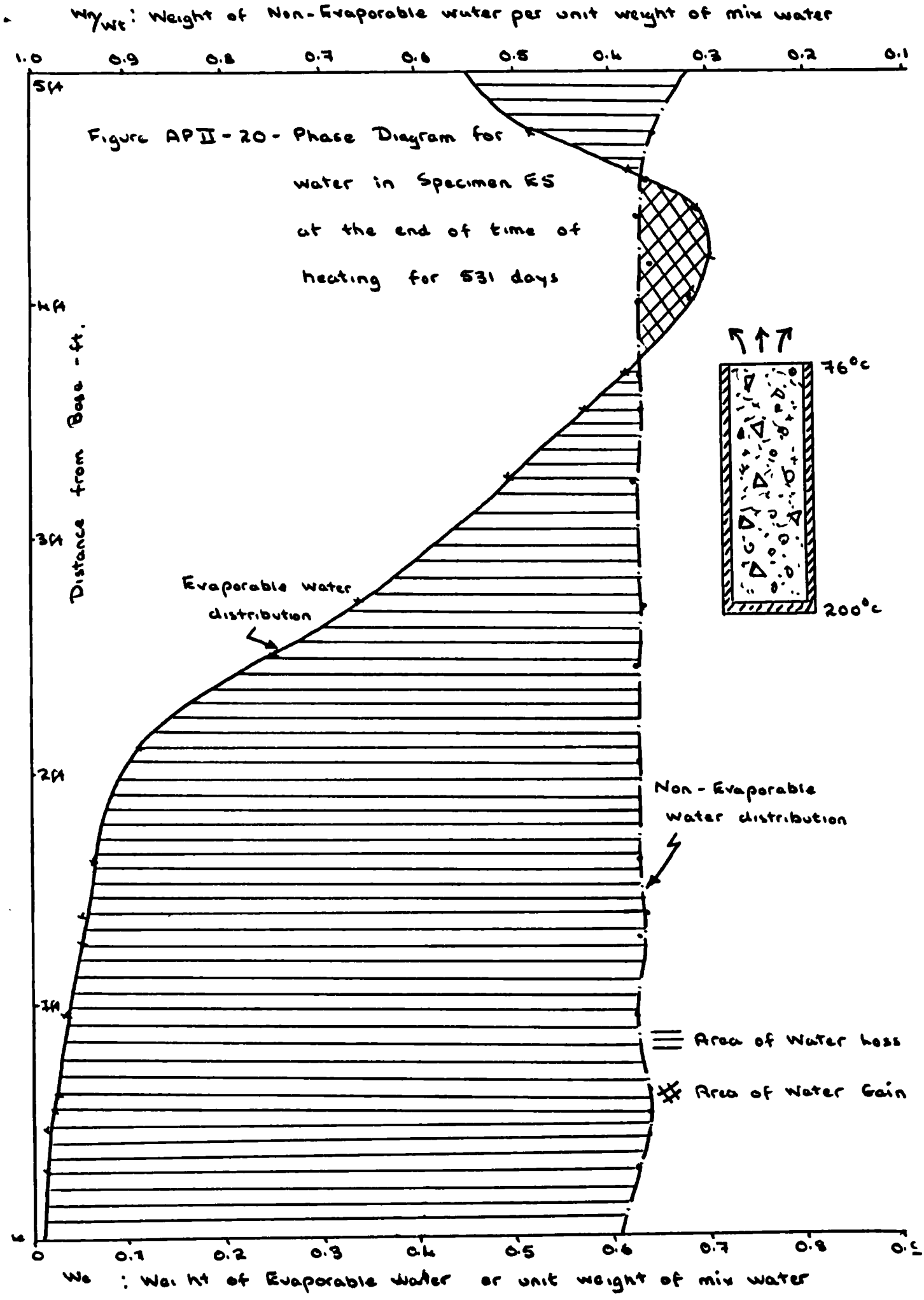


Figure AP II - 20 - Phase Diagram for water in Specimen E5 at the end of time of heating for 531 days

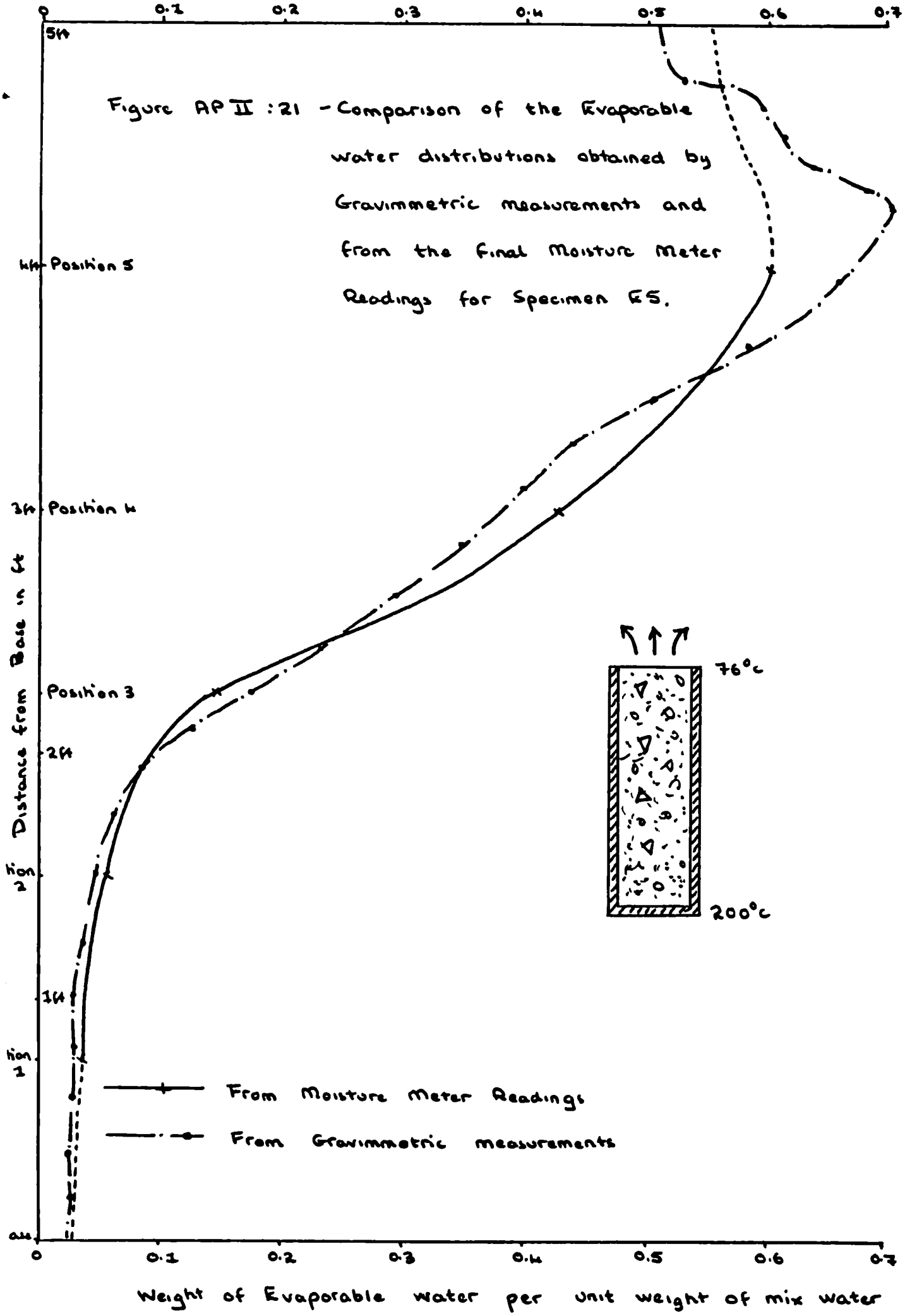


Figure AP II : 21 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen E5.

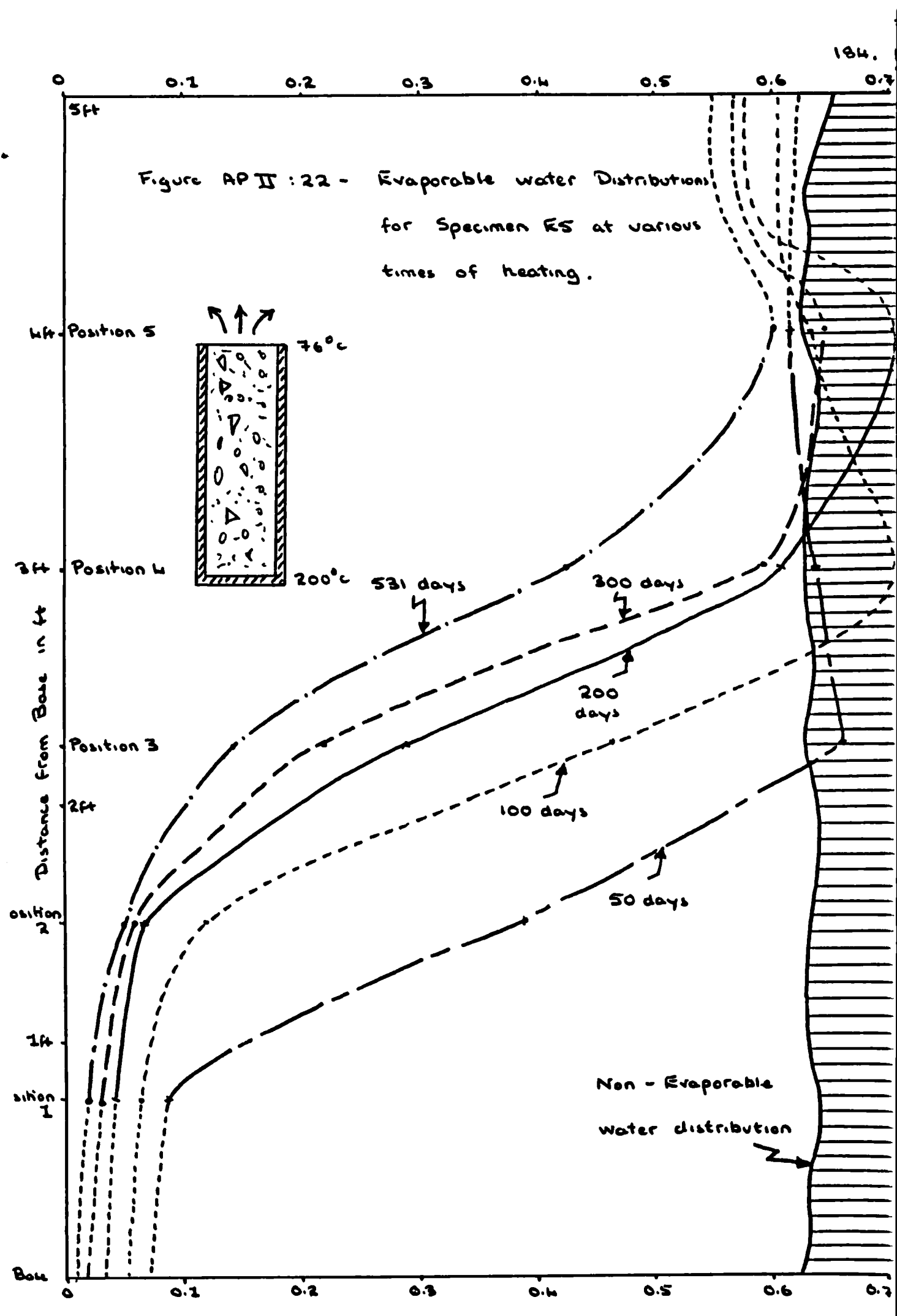


Figure AP II : 22 - Evaporable water Distributions for Specimen E5 at various times of heating.

Fig AP II : 23 - Gauge Pore Pressures at the various instrumentation positions in Specimen E5 against time of heating.

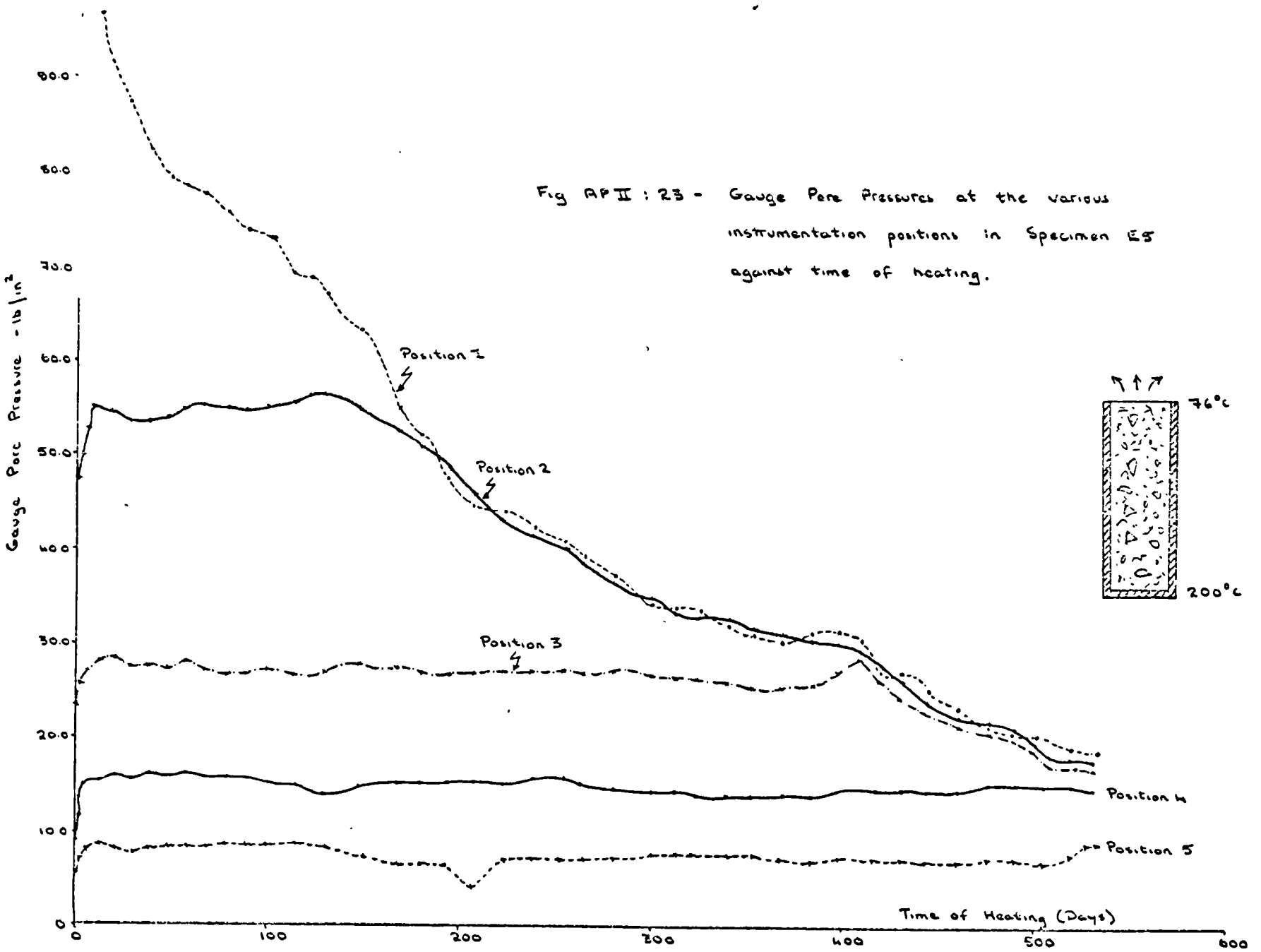
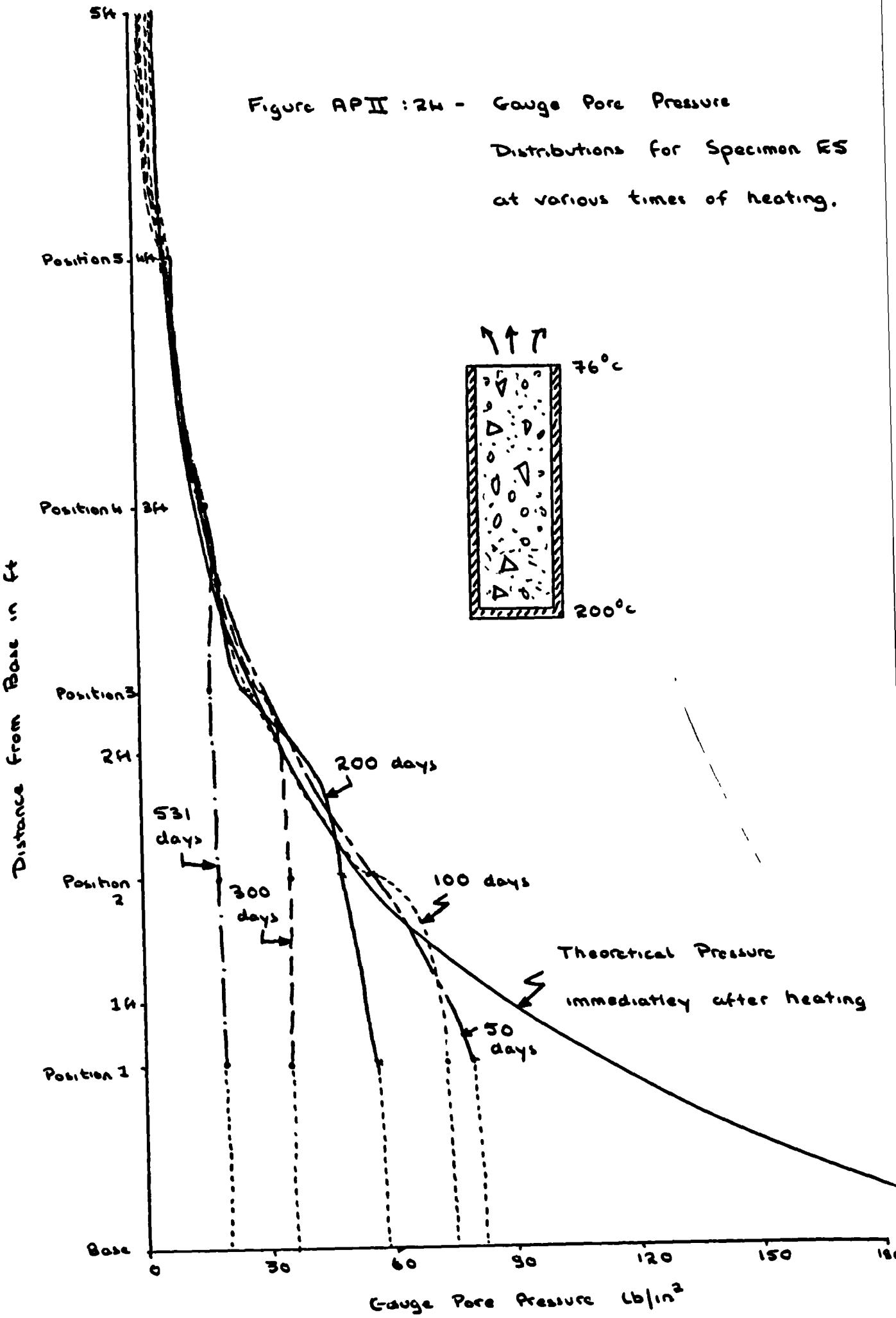


Figure APII : 2H - Gauge Pore Pressure Distributions for Specimen E5 at various times of heating.



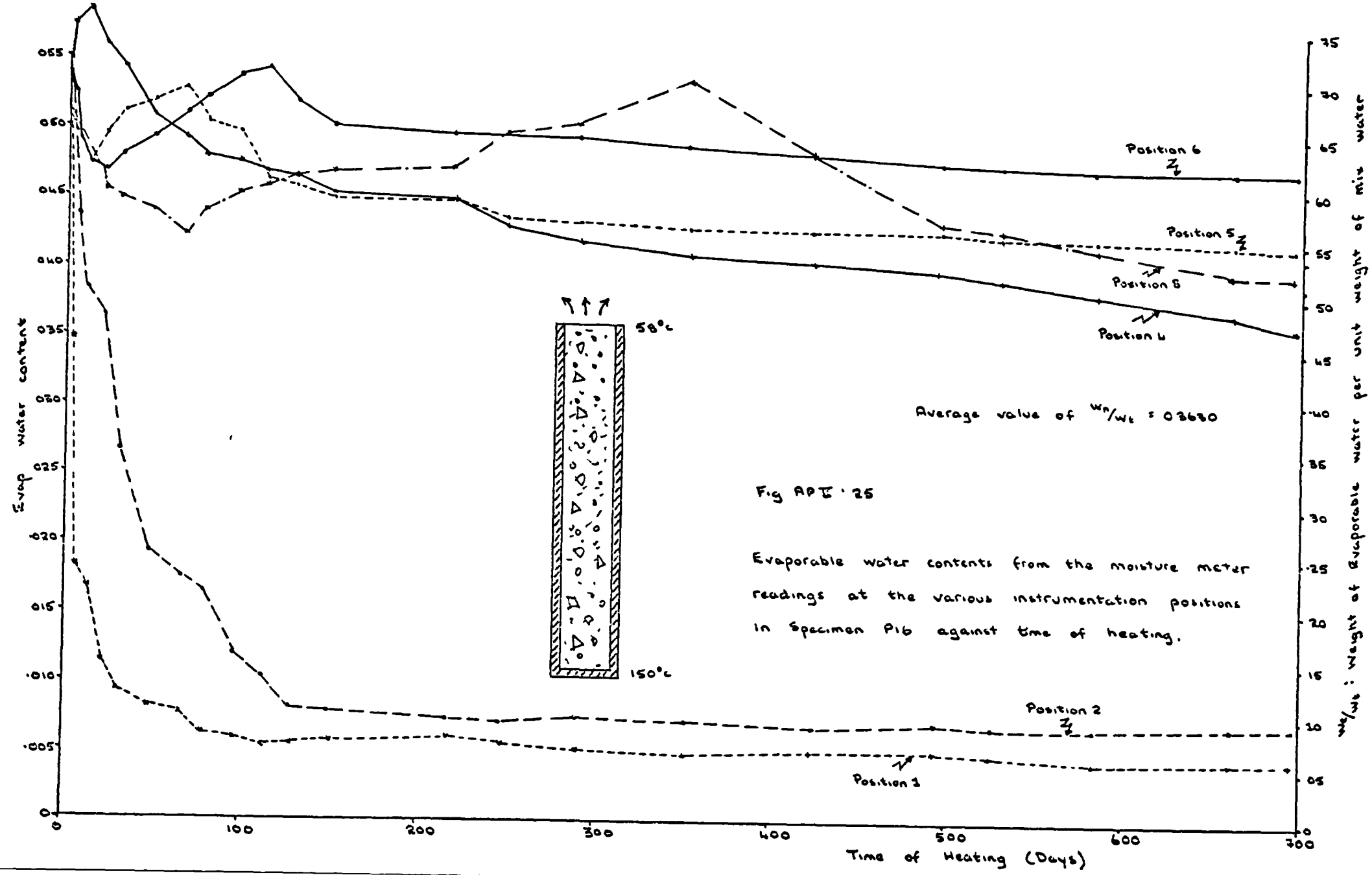


Fig APT · 25

Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen P16 against time of heating.

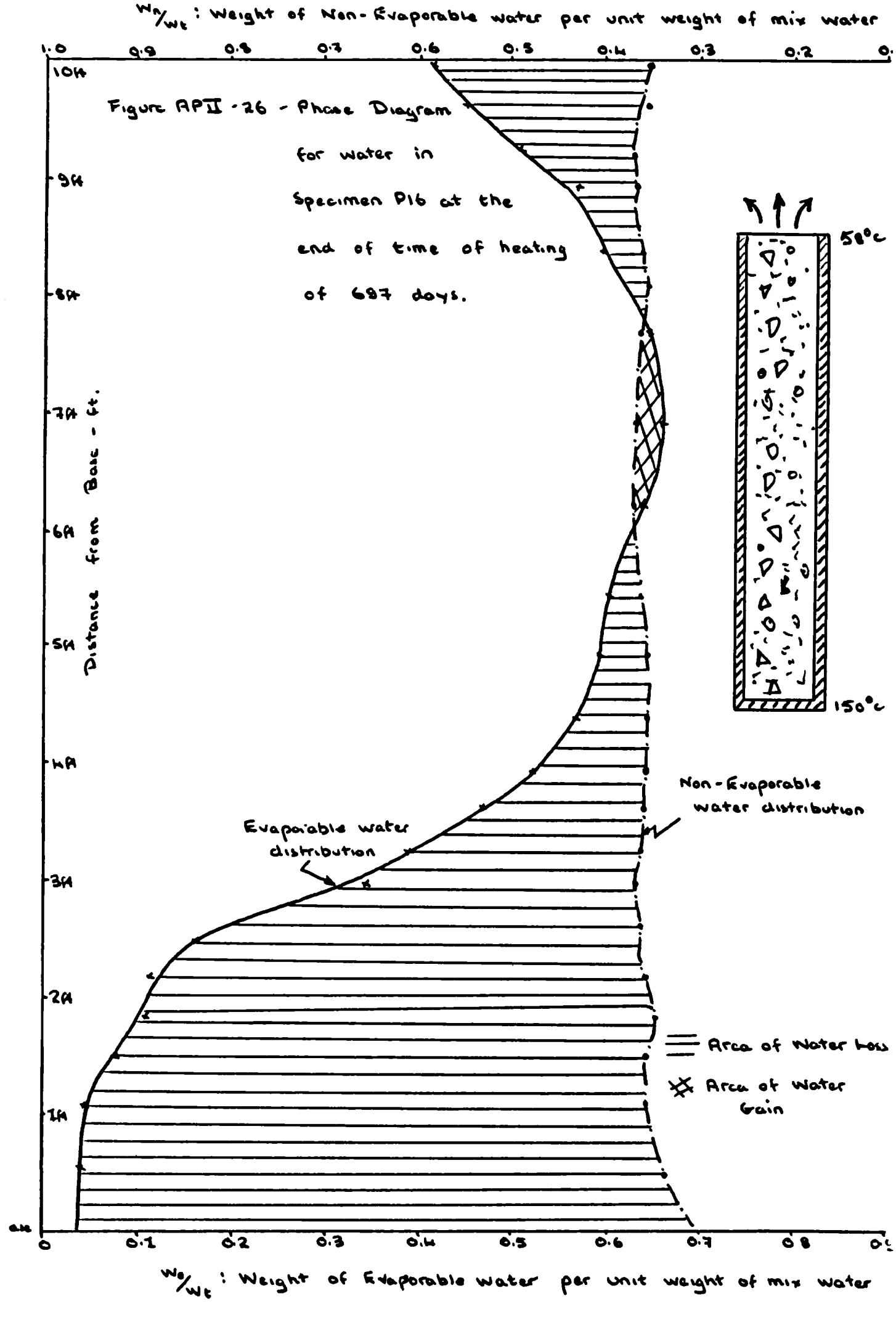


Figure APII-26 - Phase Diagram for water in Specimen P16 at the end of time of heating of 697 days.

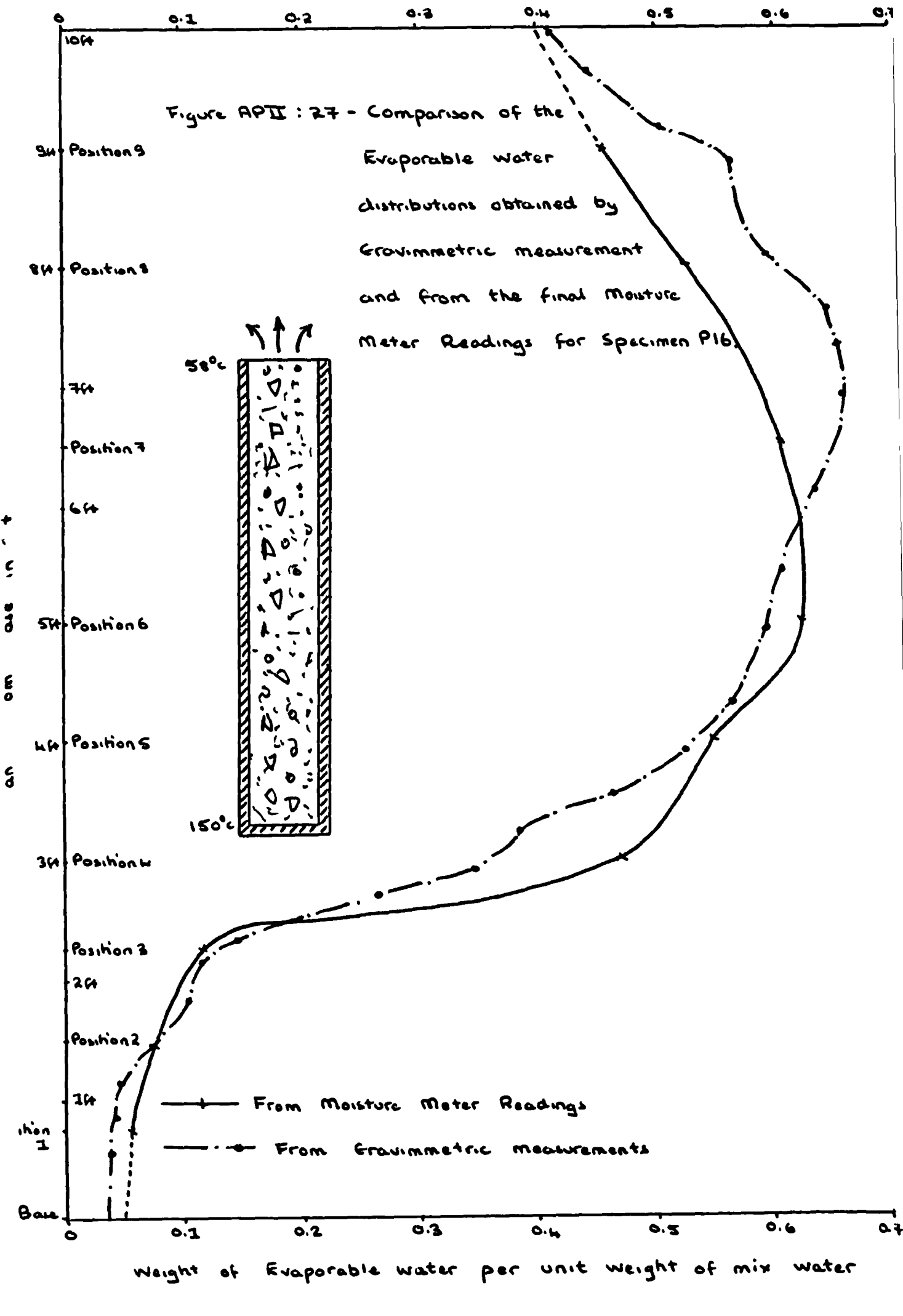


Figure APII : 27 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurement and from the final Moisture Meter Readings for Specimen P16.

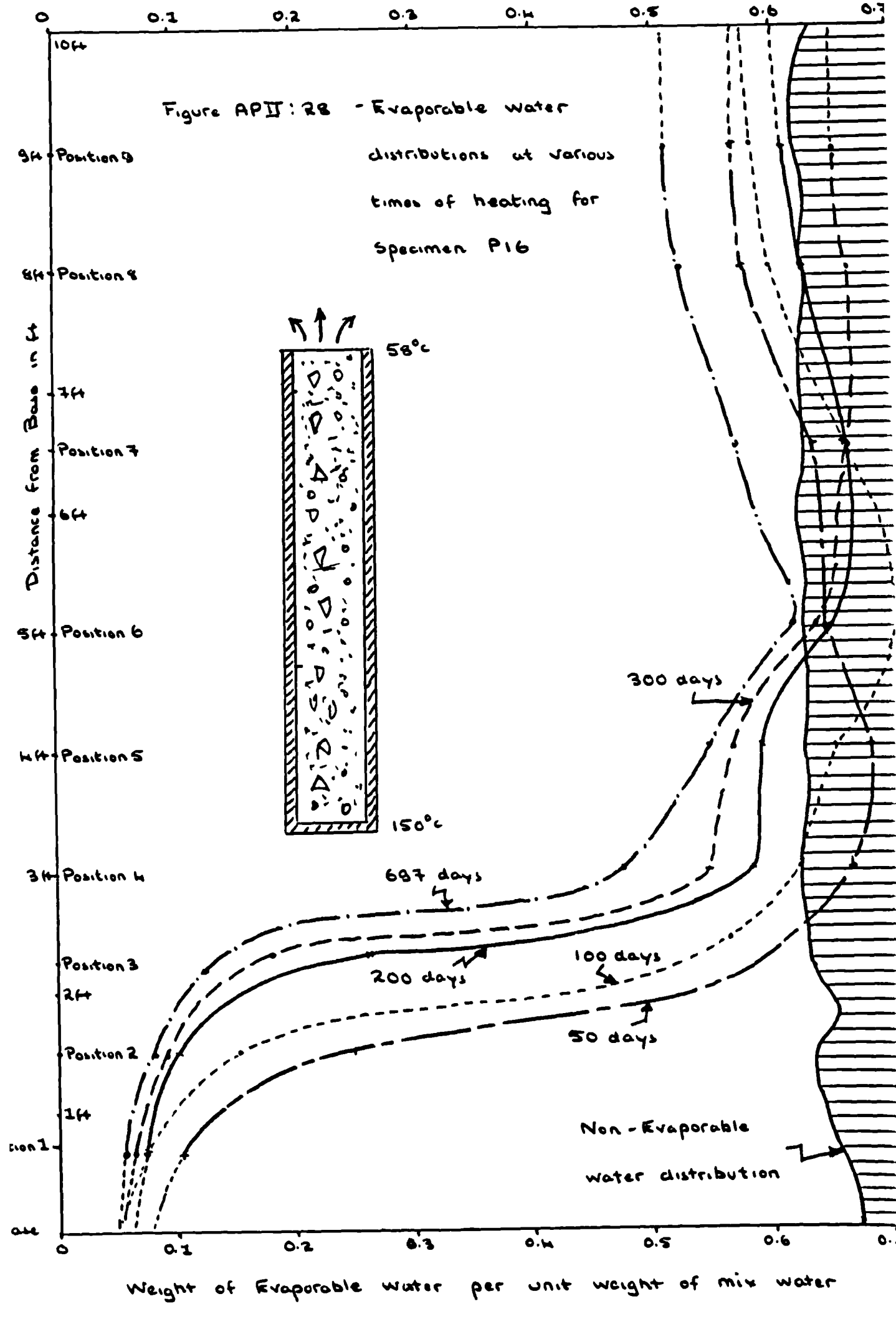


Figure APII:28 - Evaporable water distributions at various times of heating for Specimen P16

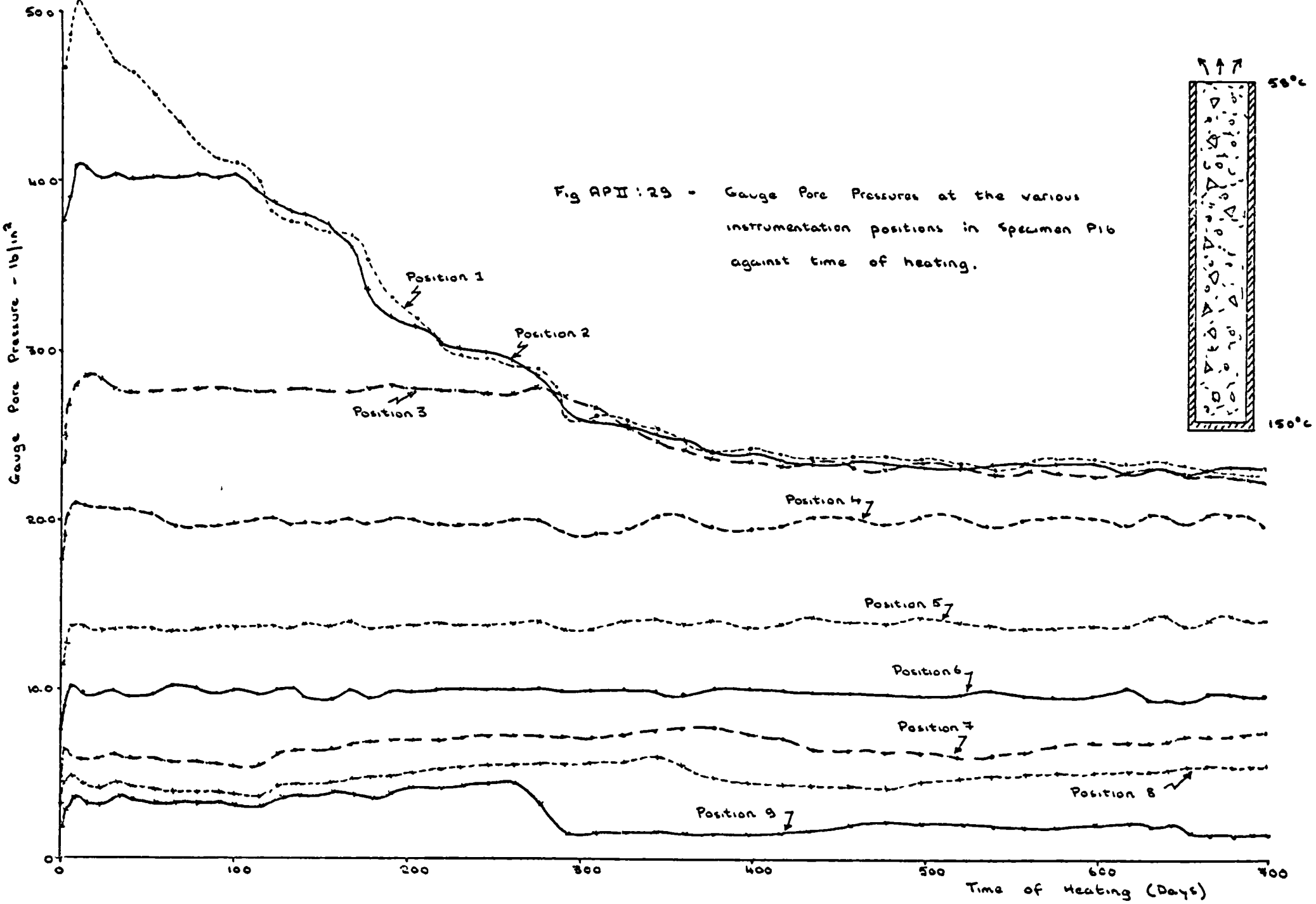


Fig APII : 29 - Gauge Pore Pressures at the various instrumentation positions in Specimen P16 against time of heating.

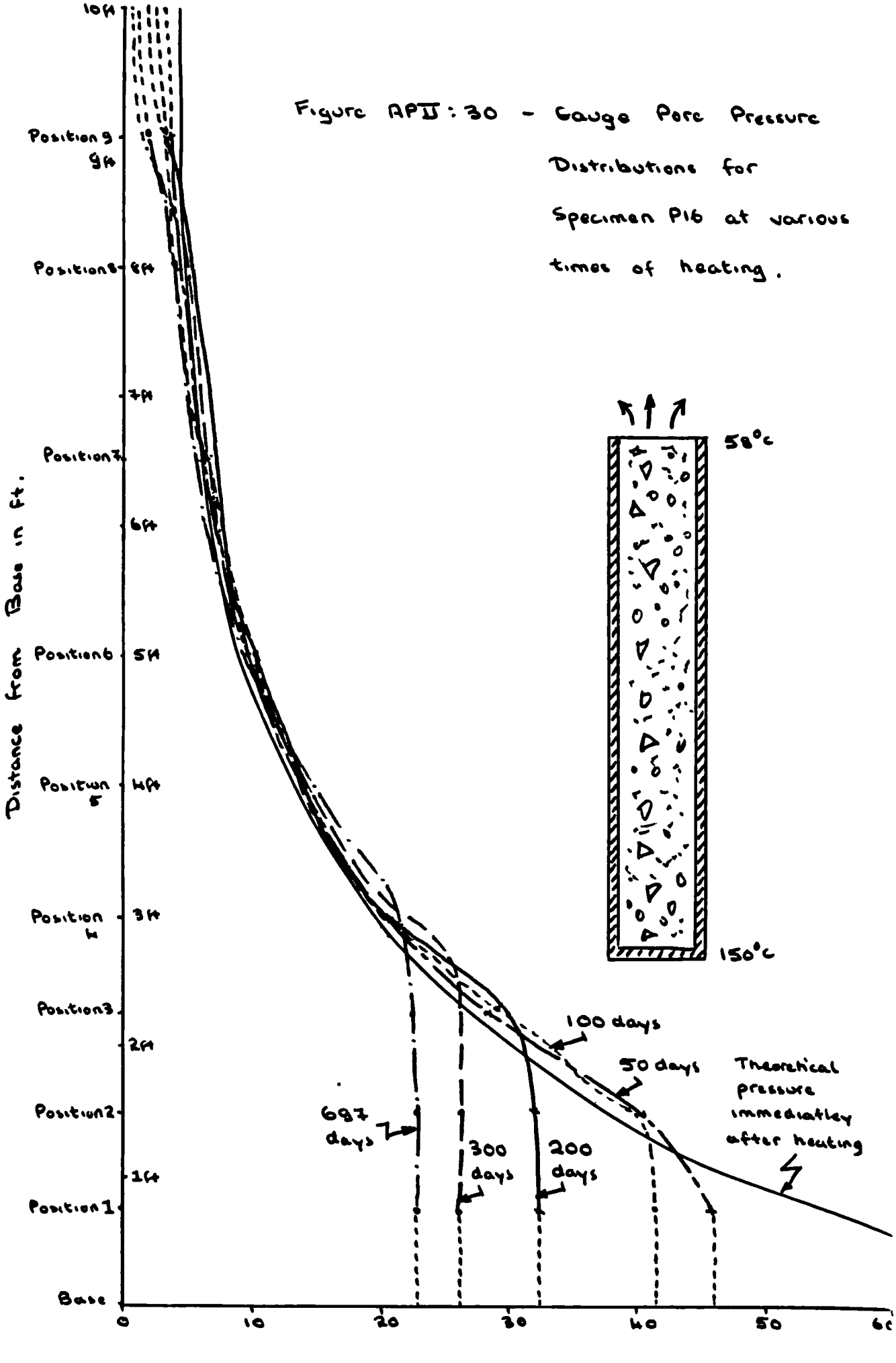


Figure APII : 30 - Gauge Pore Pressure Distributions for Specimen P16 at various times of heating.

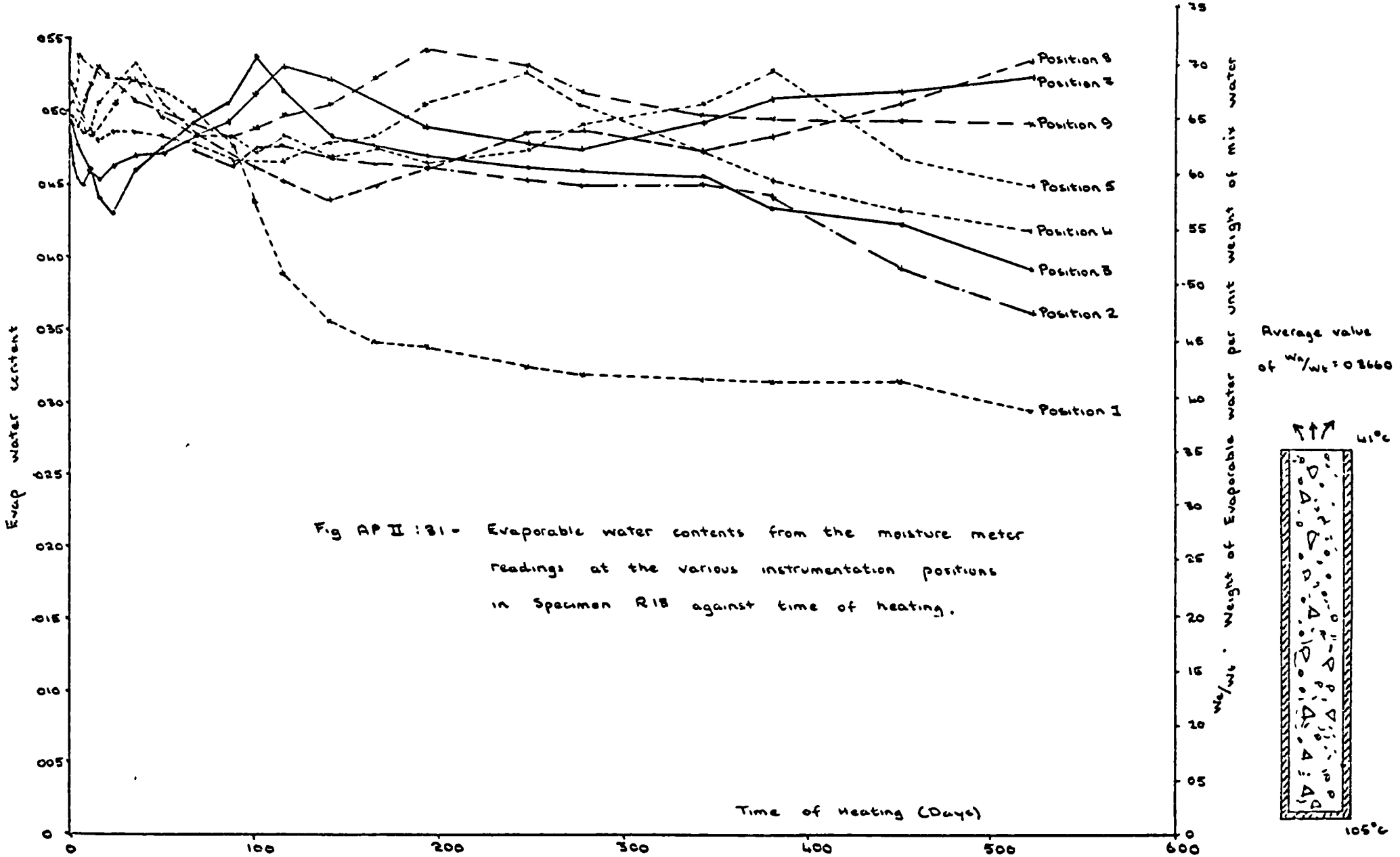


Fig AP II : 81 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen R18 against time of heating.

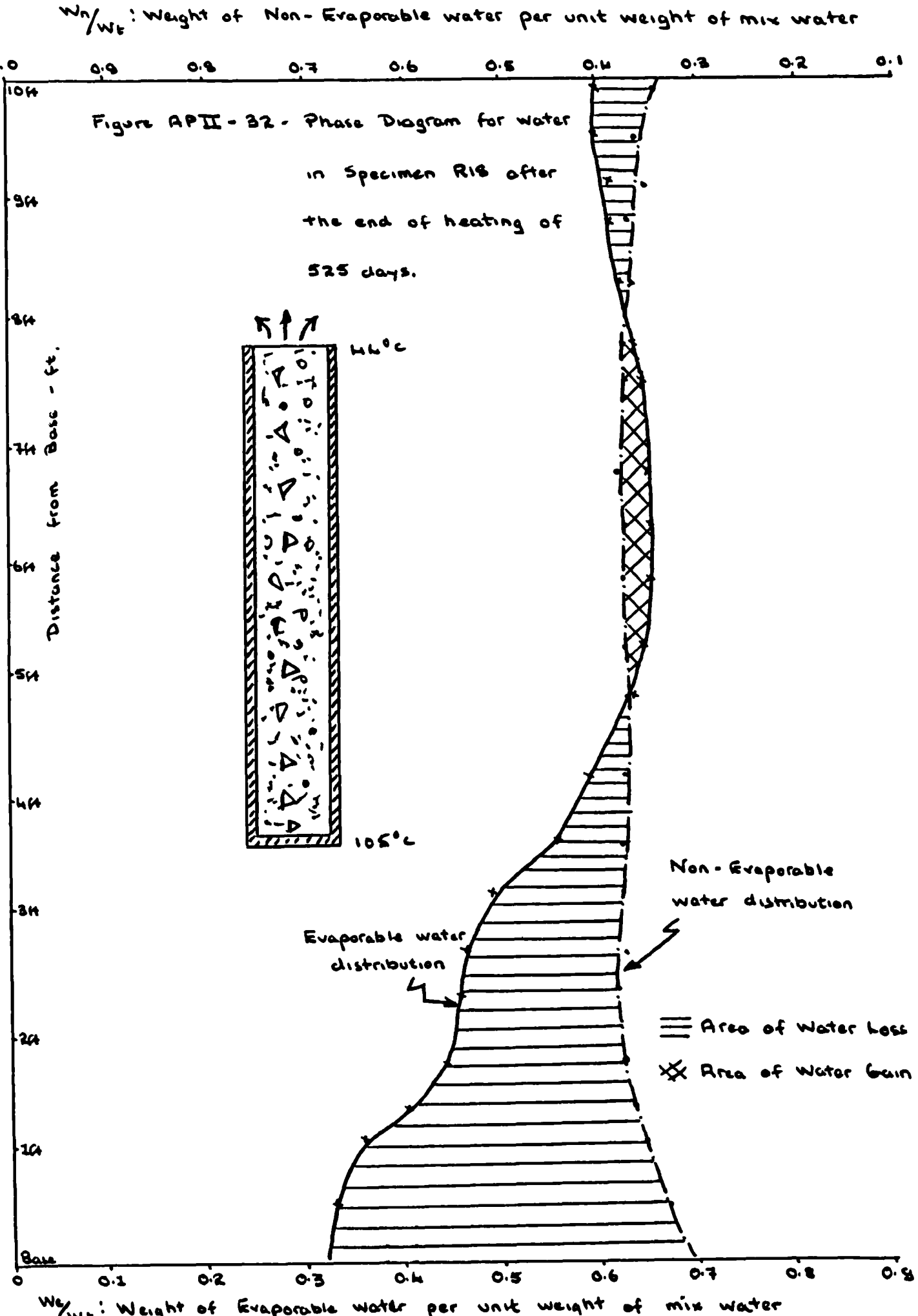
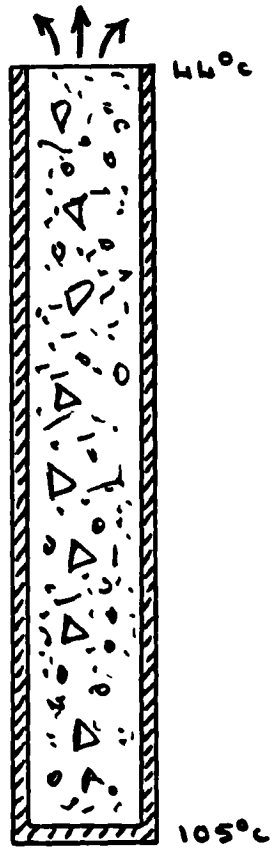


Figure APII-32 - Phase Diagram for water in Specimen R18 after the end of heating of 525 days.

Figure APII : 33 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture meter Readings for Specimen R18.



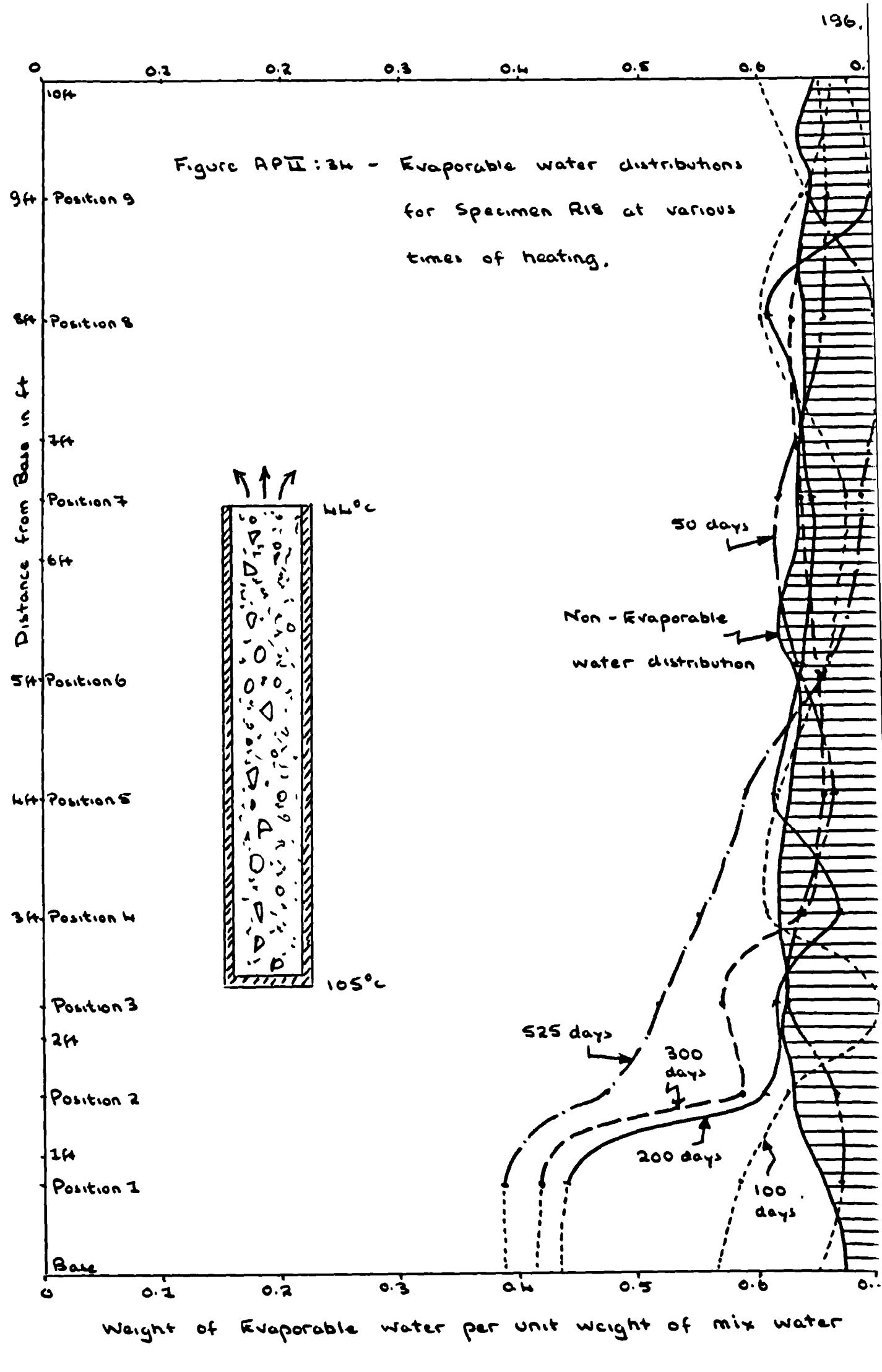
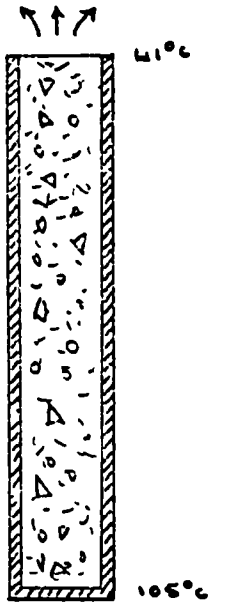


Figure AP II : 34 - Evaporable water distributions for Specimen R18 at various times of heating.

Fig AP II : 35 - Gauge Pore Pressures at the various instrumentation positions in Specimen R18 against time of heating.



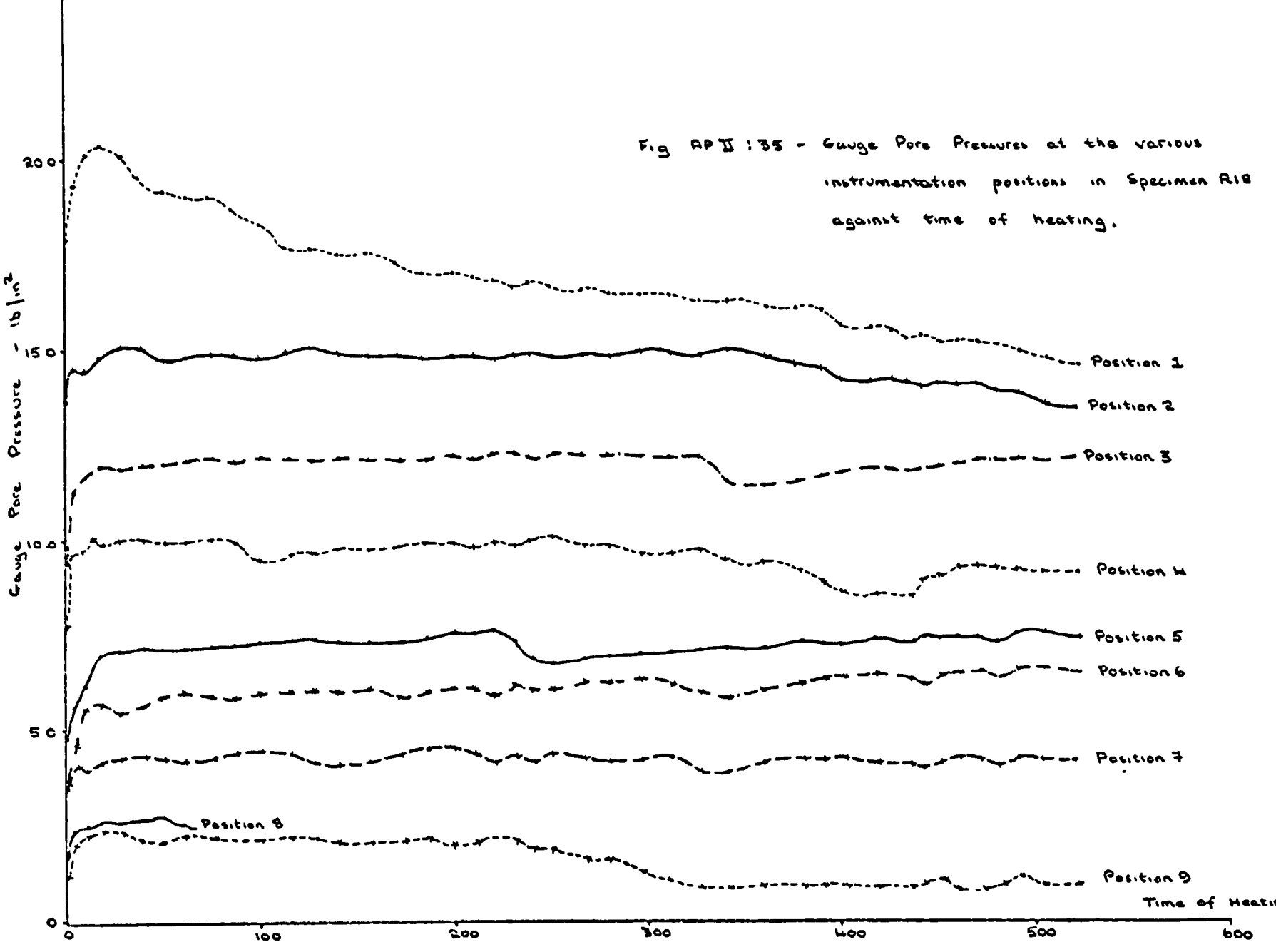
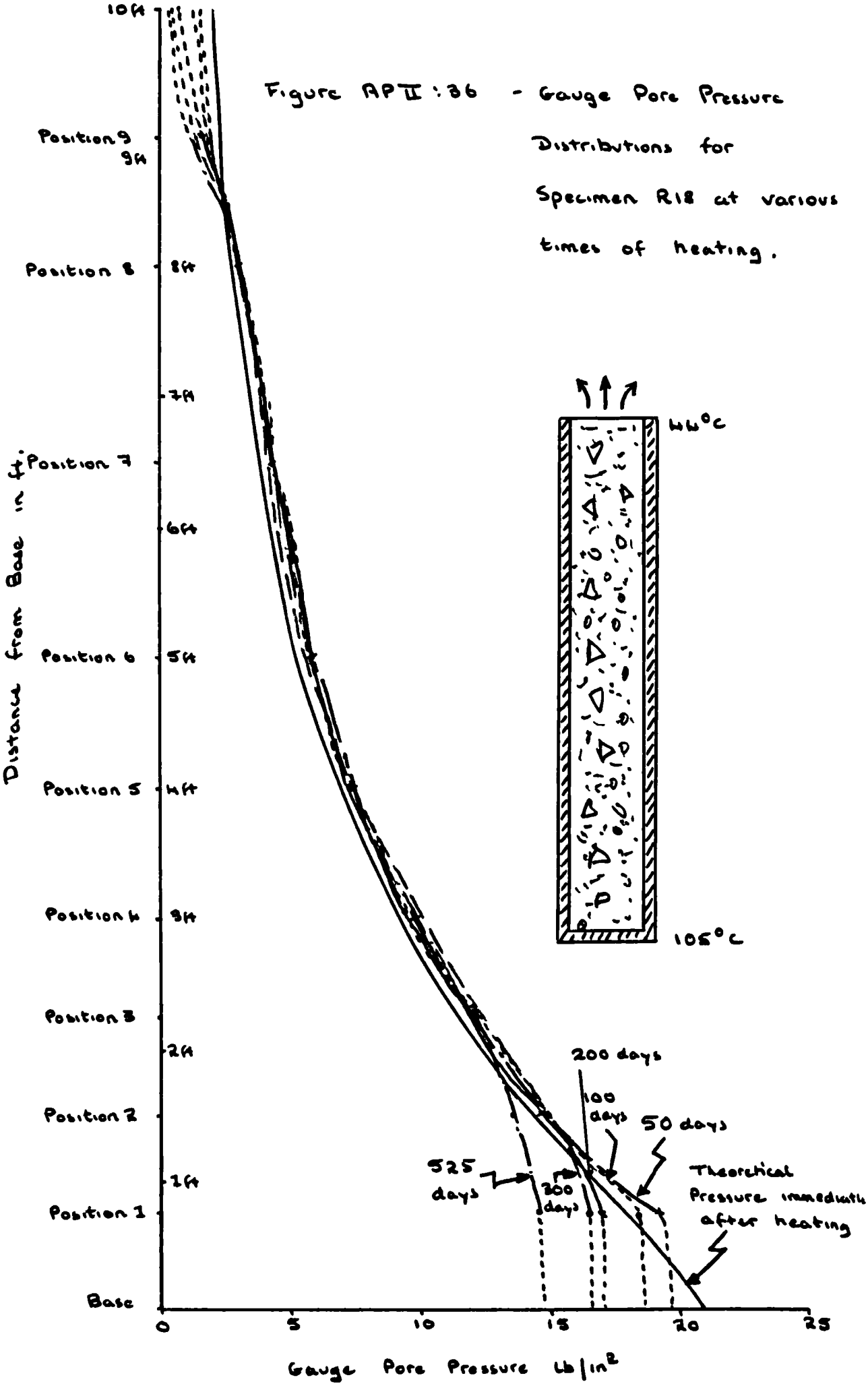


Figure AP II : 36 - Gauge Pore Pressure Distributions for Specimen R18 at various times of heating.



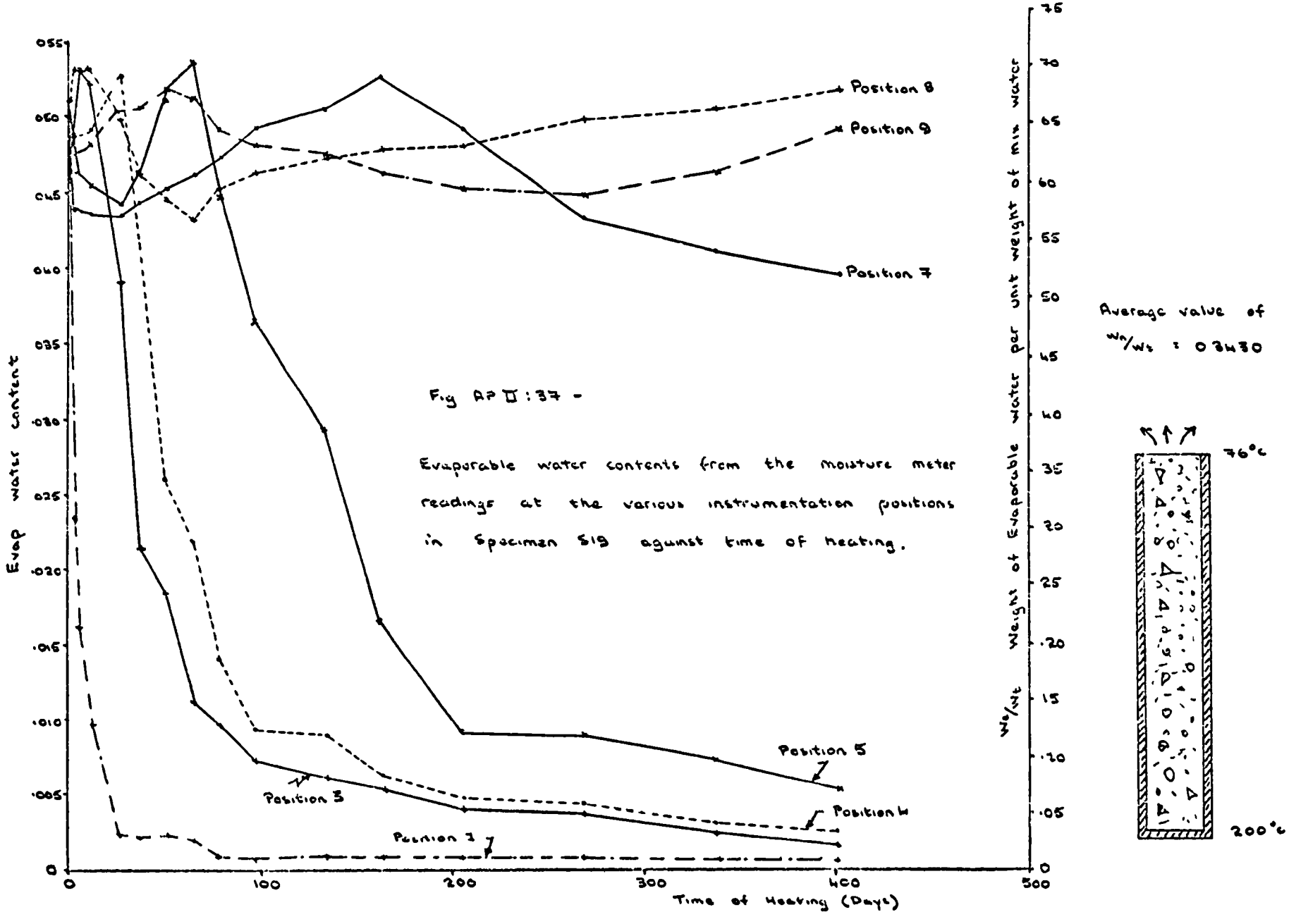
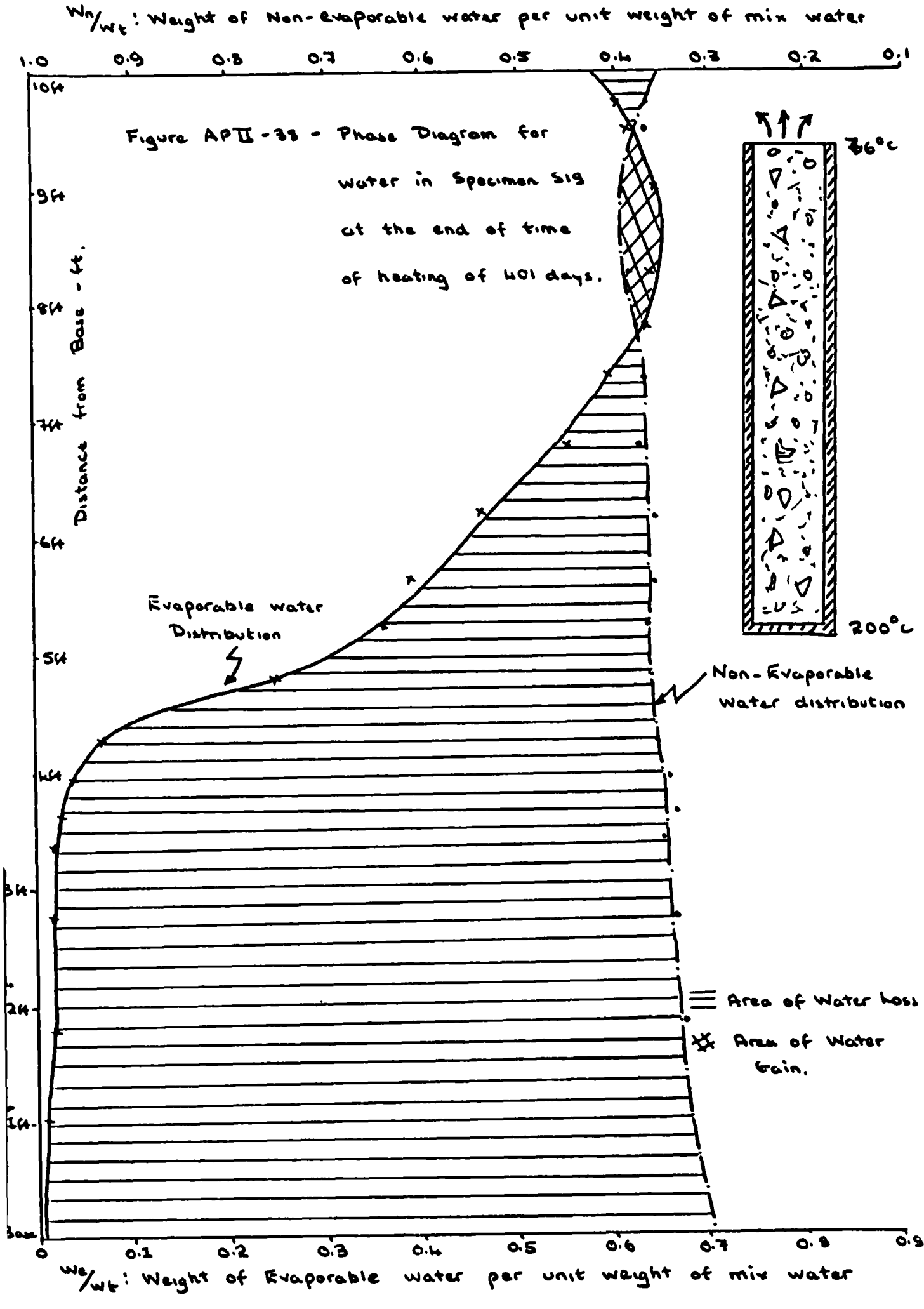


Fig AP II : 37 -

Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen S19 against time of heating.

Average value of W_e/W_t = 0·3430


W_n/W_t : Weight of Non-evaporable water per unit weight of mix water
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Distance from Base - ft.
Figure APII-38 - Phase Diagram for water in Specimen S19 at the end of time of heating of 401 days.
86°C
200°C
Evaporable water Distribution
Non-Evaporable water distribution
Area of Water loss
Area of Water Gain.
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
W_e/W_t : Weight of Evaporable water per unit weight of mix water

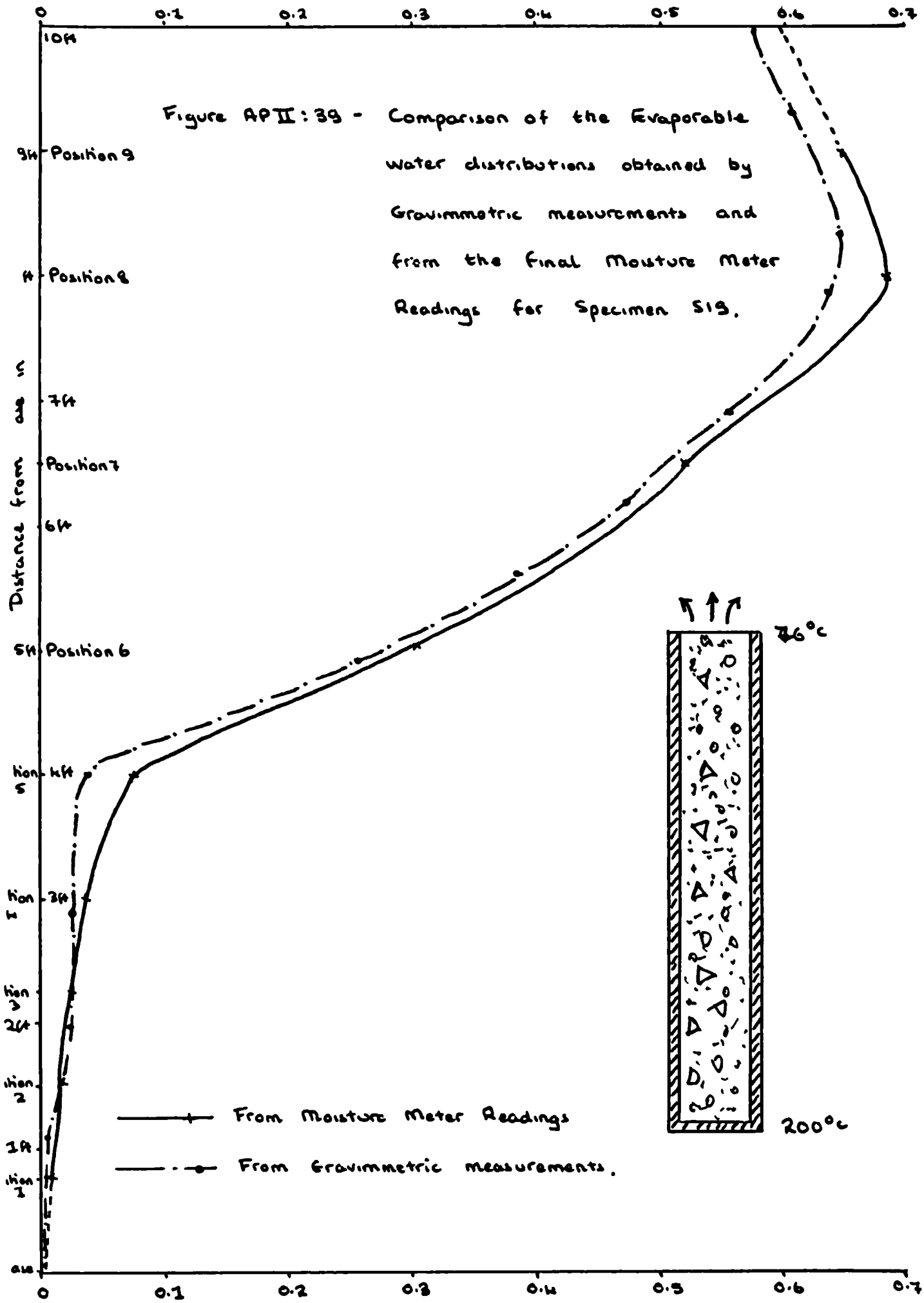


Figure APII: 39 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Mouture Meter Readings for Specimen S19.

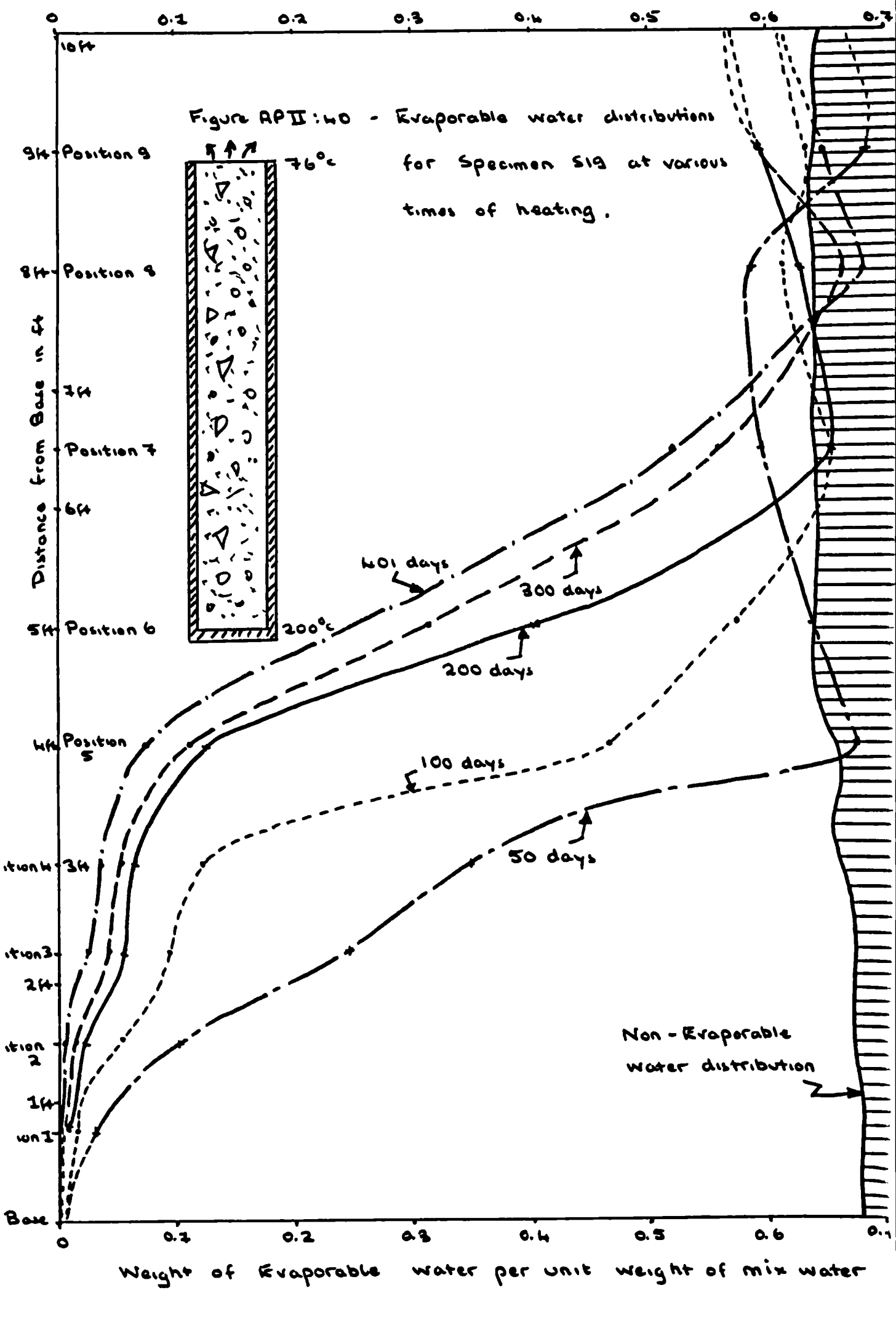


Figure AP II : 40 - Evaporable water distributions for Specimen S19 at various times of heating.

Fig APII·41 - Gauge Pore Pressures at the various instrumentation positions in Specimen S19 against time of heating.

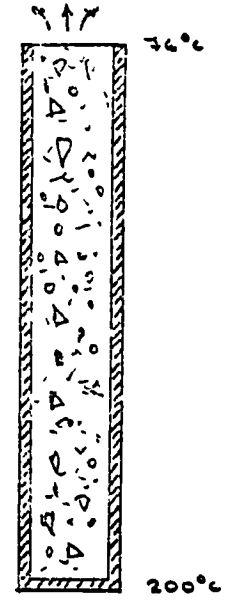


Figure APII : W2 - Gauge Pore Pressure distributio for Speciman S1g at various times of heating.

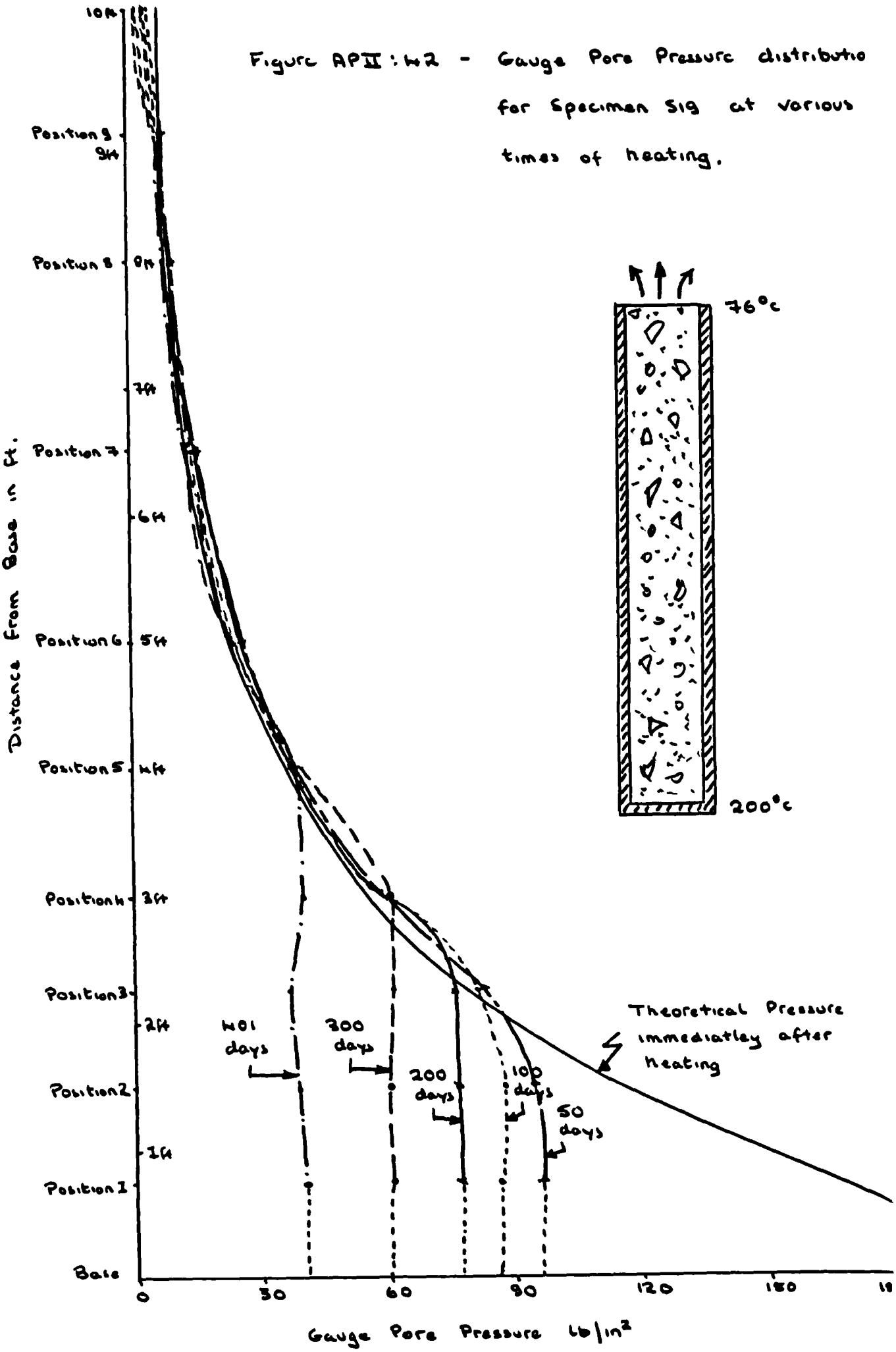
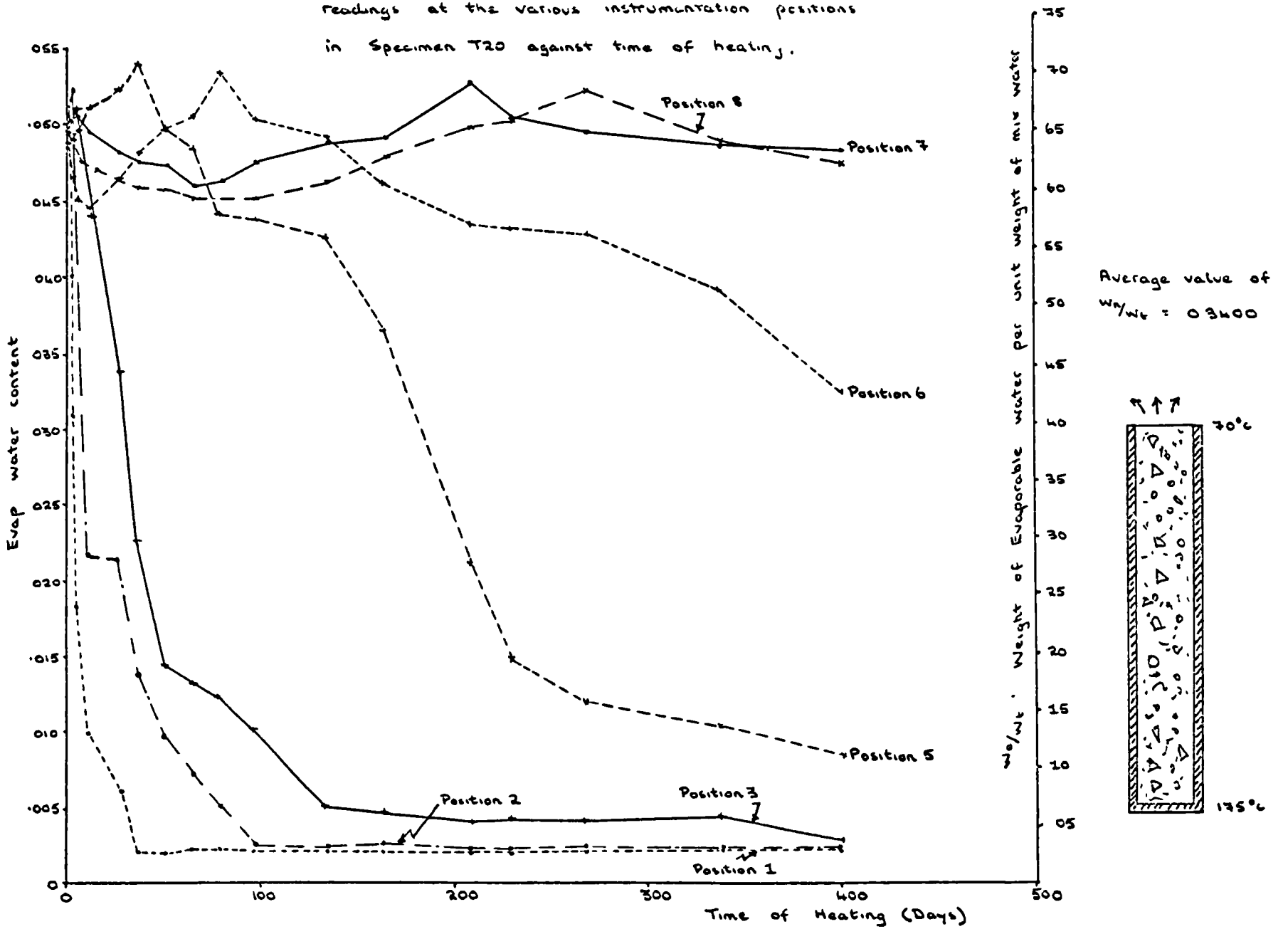
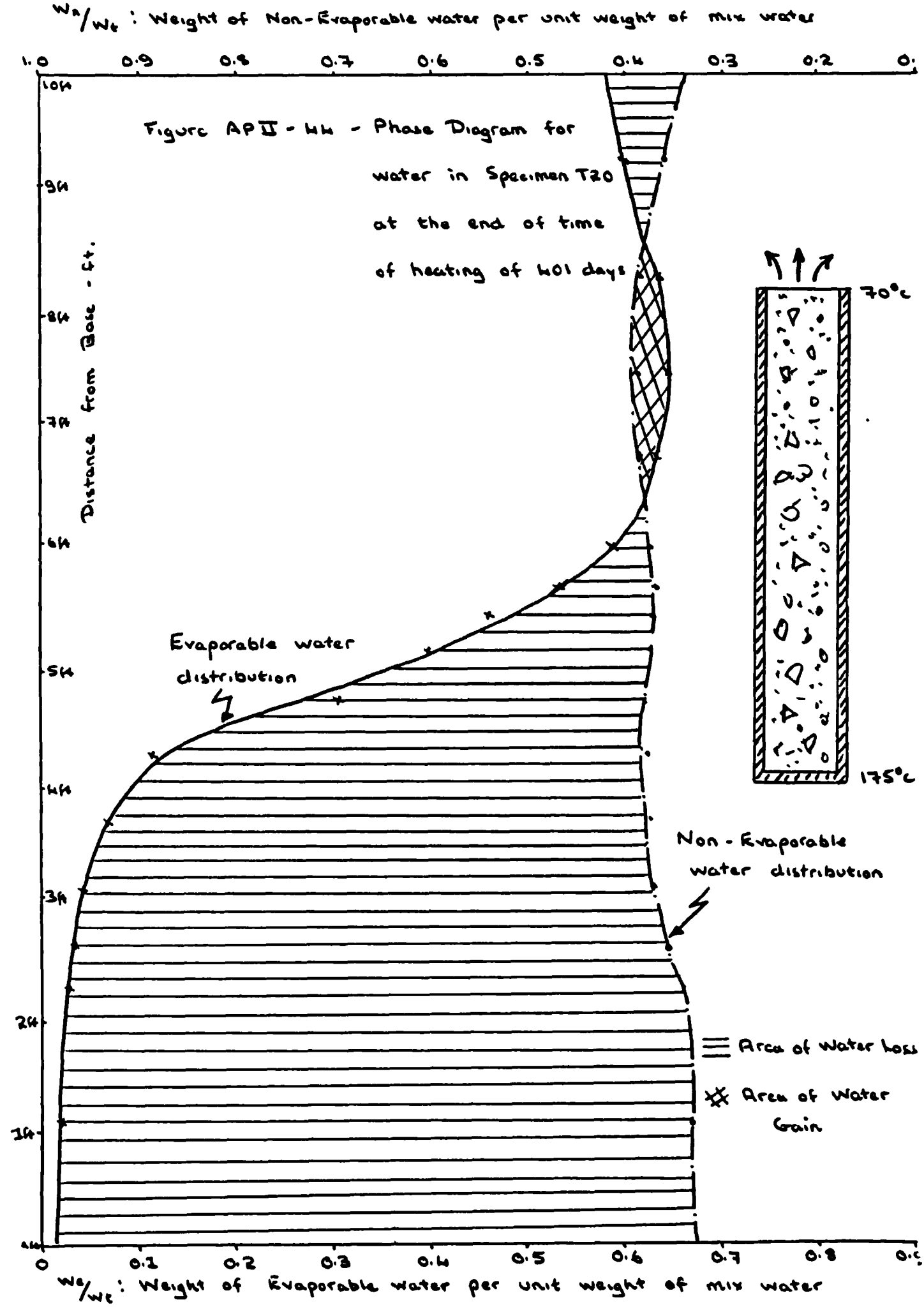


Fig APII 43 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen T20 against time of heating.




W_n/W_t : Weight of Non-Evaporable water per unit weight of mix water
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Distance from Base - ft.
Figure AP II - 44 - Phase Diagram for water in Specimen T20 at the end of time of heating of 401 days
70°c
175°c
Evaporable water distribution
Non - Evaporable water distribution
Area of water loss
Area of water Gain
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
W_e/W_t : Weight of Evaporable water per unit weight of mix water

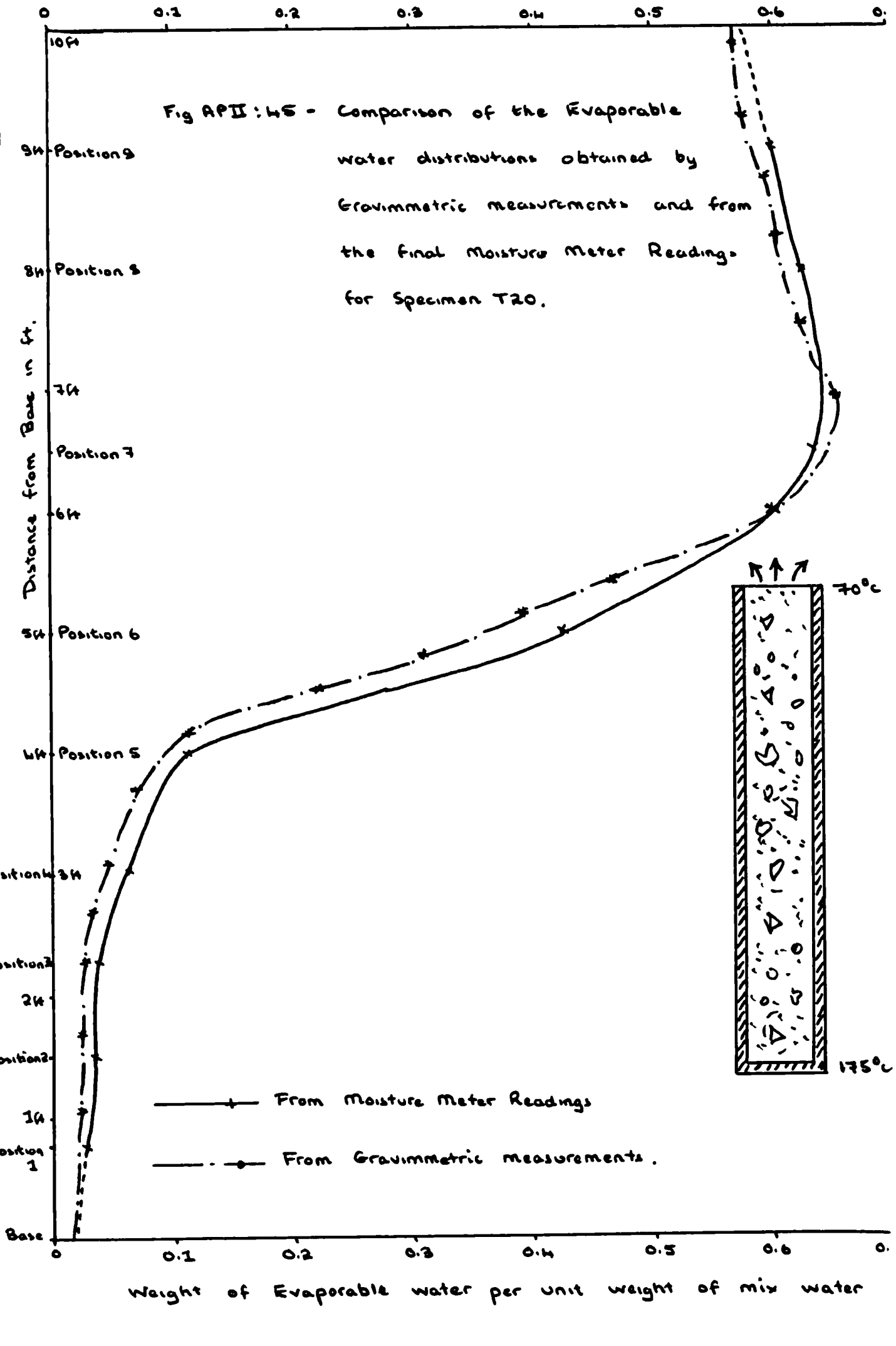


Fig APII:45 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen T20.

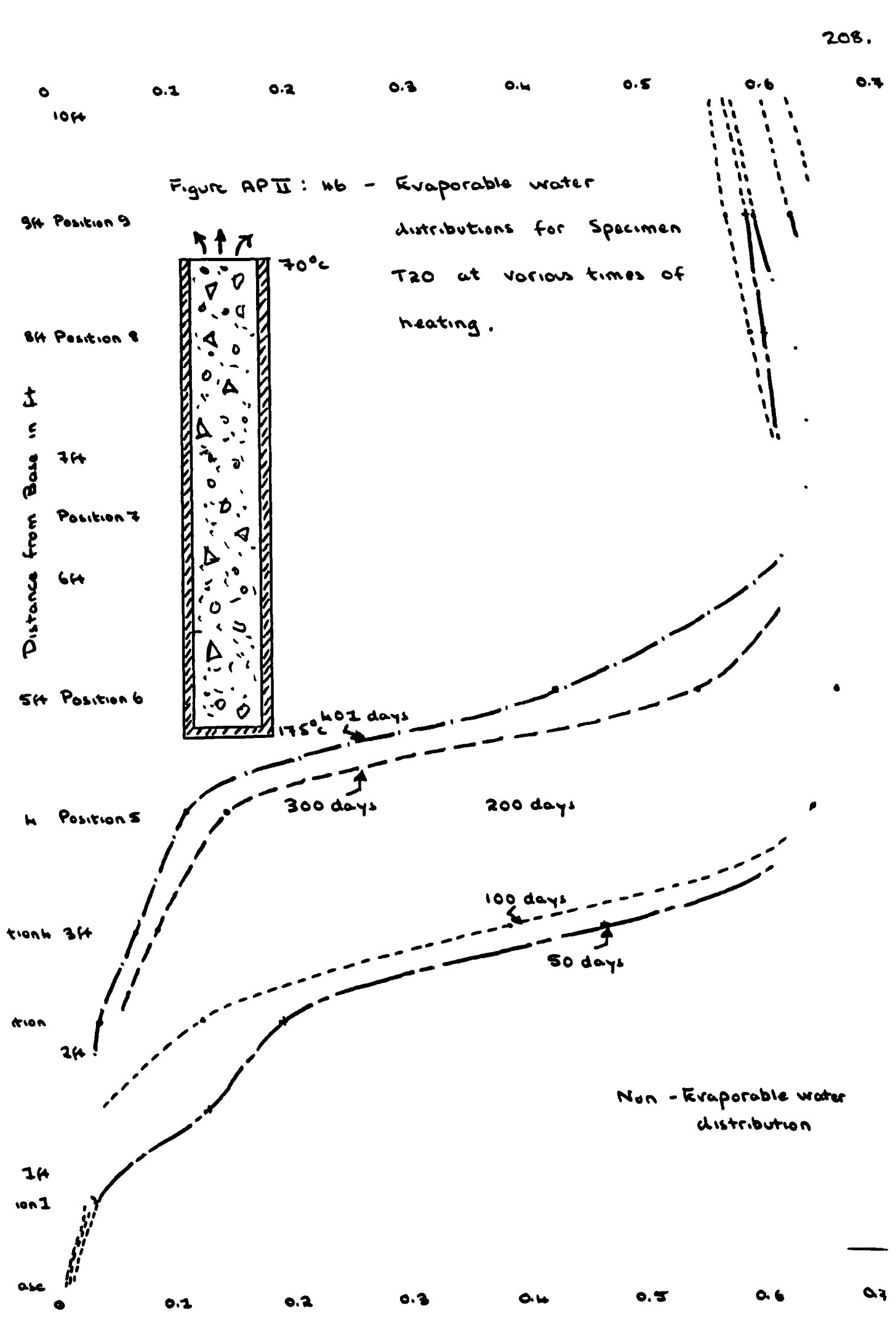


Figure AP II : 46 - Evaporable water distributions for Specimen T20 at various times of heating.

Fig RP II : 47 - Gauge Pore Pressures at the various instrumentation positions in Specimen T20 against time of heating.

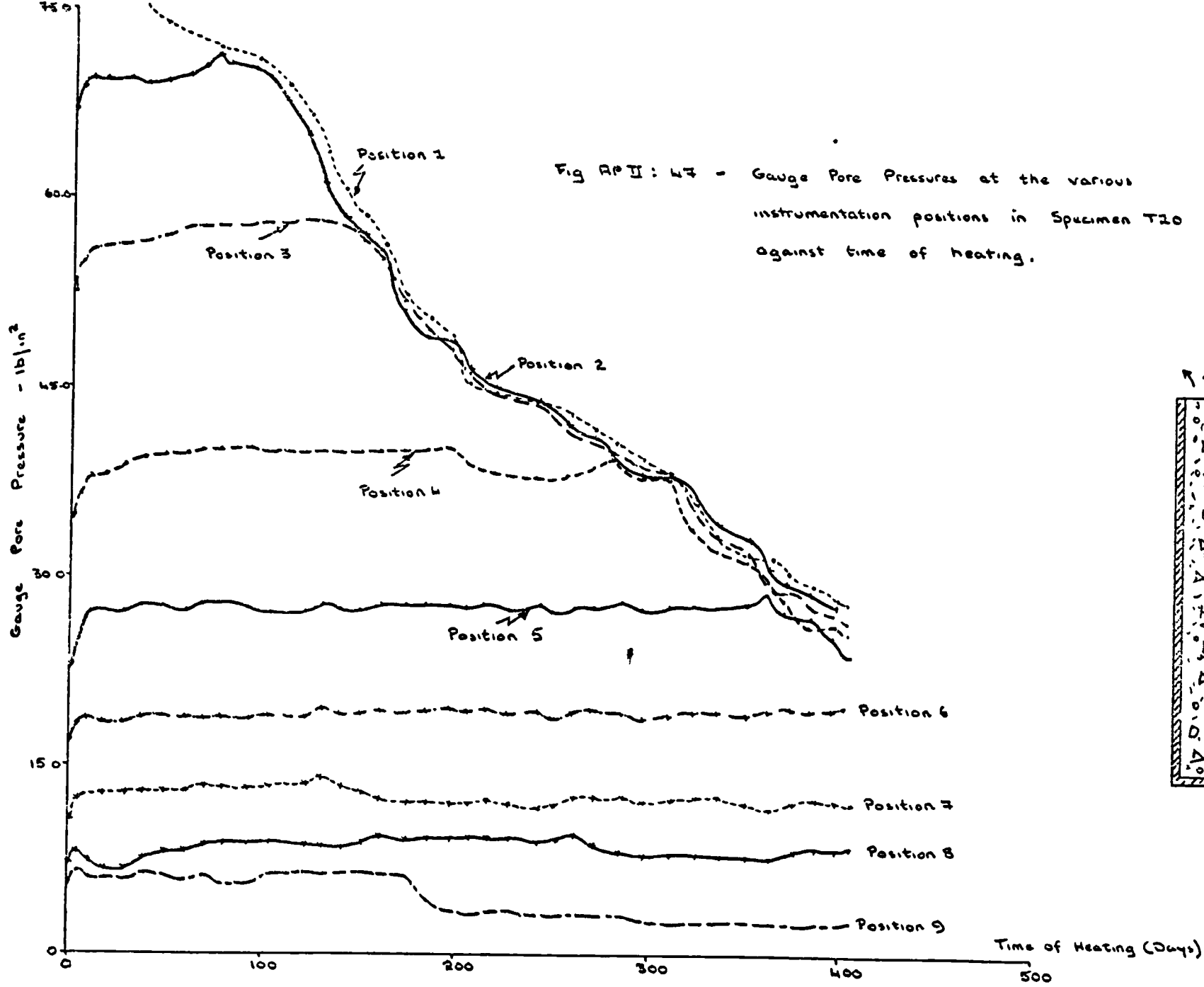
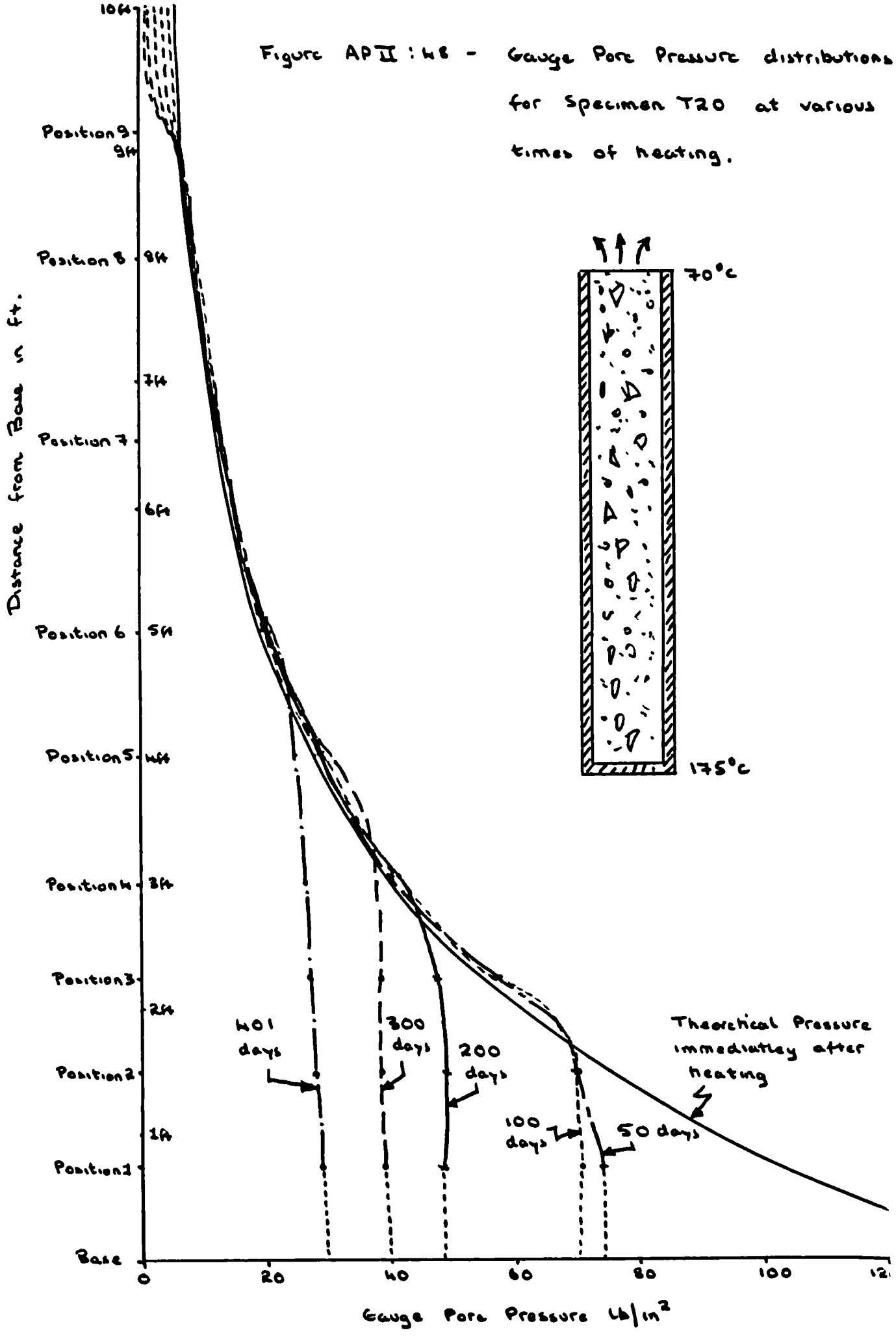
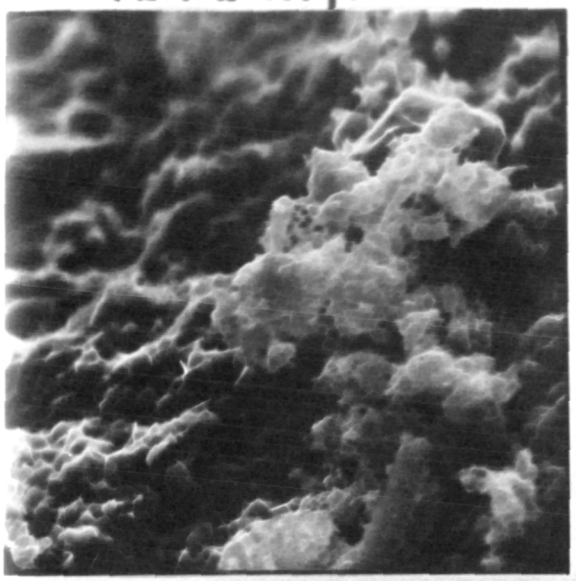


Figure AP II : 48 - Gauge Pore Pressure distributions for Specimen T20 at various times of heating.



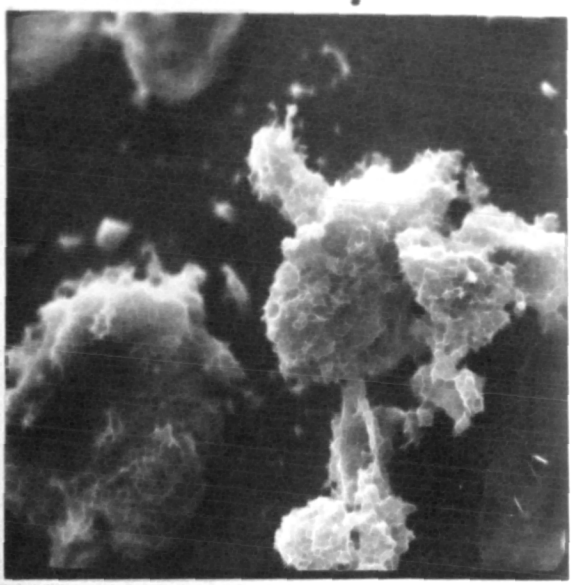
MIGRATION SERIES

PLATE A1|1 - sections 5&6



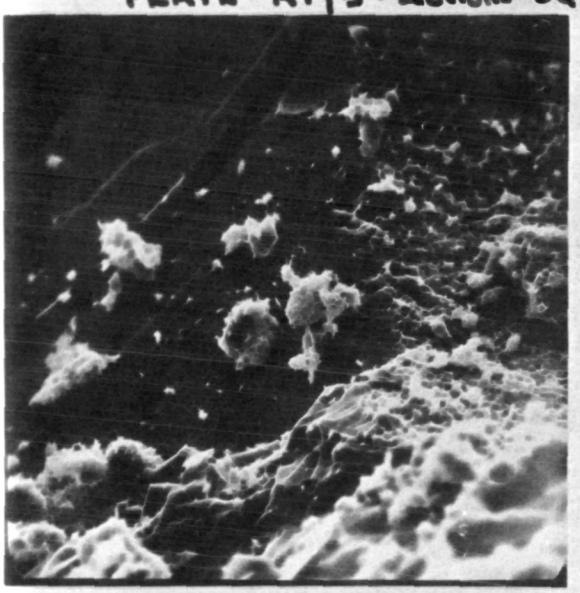
Magnification 2.08K 5μm

PLATE A1|2 - sections 5&6



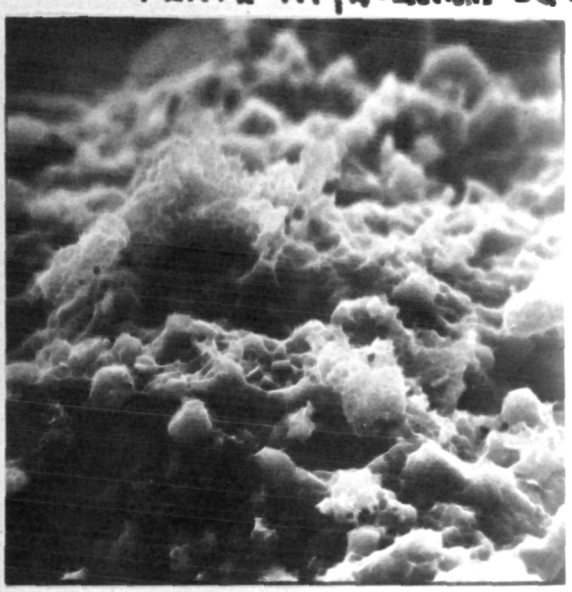
Magnification 2.08K 5μm

PLATE A1|3 - sections 5&6



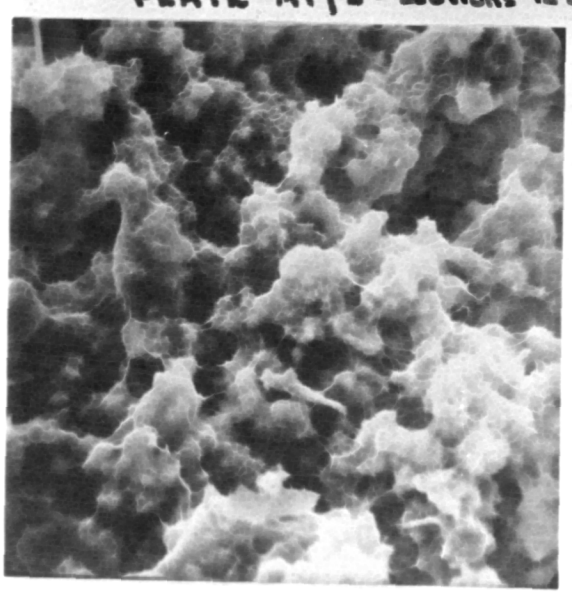
Magnification 520x 20μm

PLATE A1|4 - sections 5&6



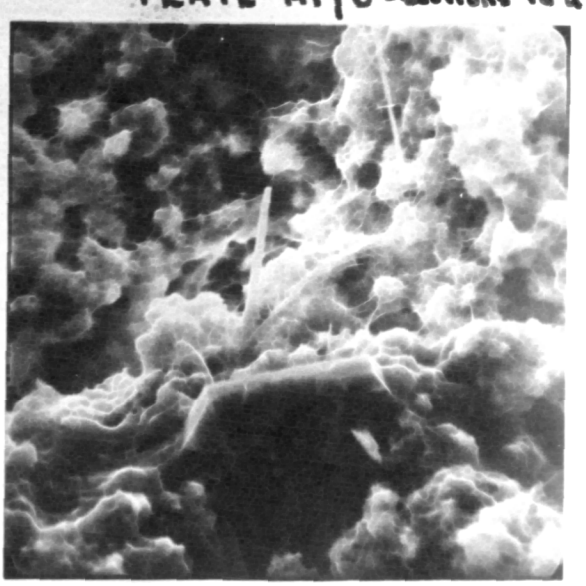
Magnification 1.96K 5μm

PLATE A1|5 - sections 18&19



Magnification 1.05K 10μm

PLATE A1|6 - sections 18&19

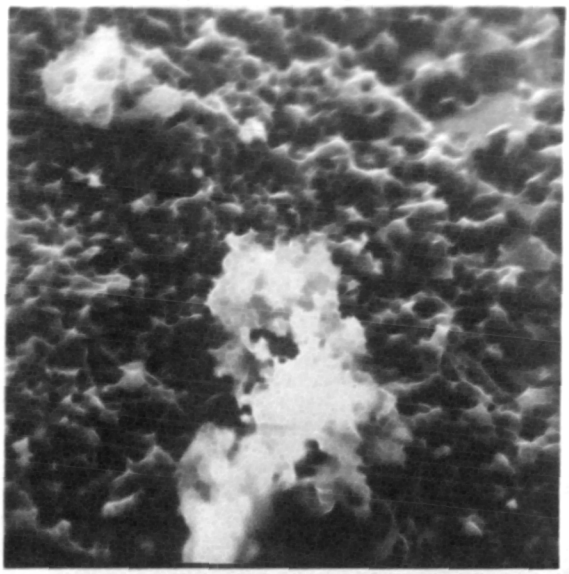


Magnification 1.06K 10μm

For listing of sections, see page 321, Volume I

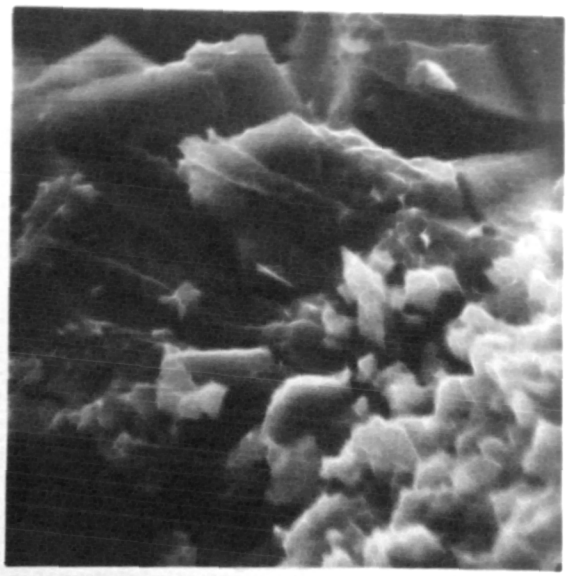
MIGRATION SERIES

PLATE A1|7 - sections 18 & 19



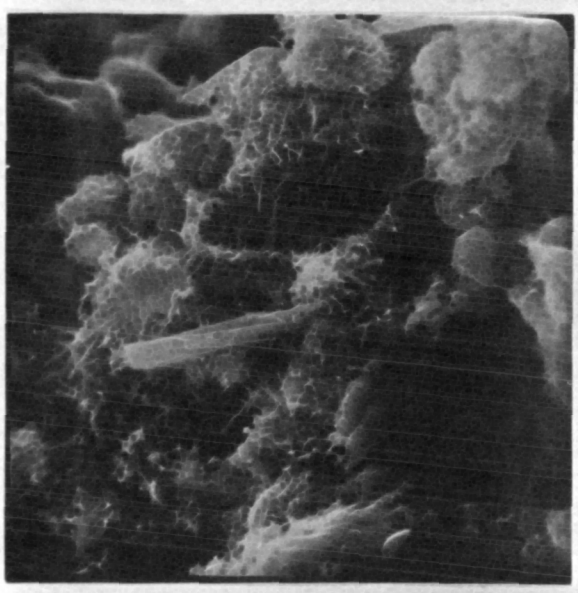
Magnification 1.18K 10μm

PLATE A1|8 - sections 18 & 19



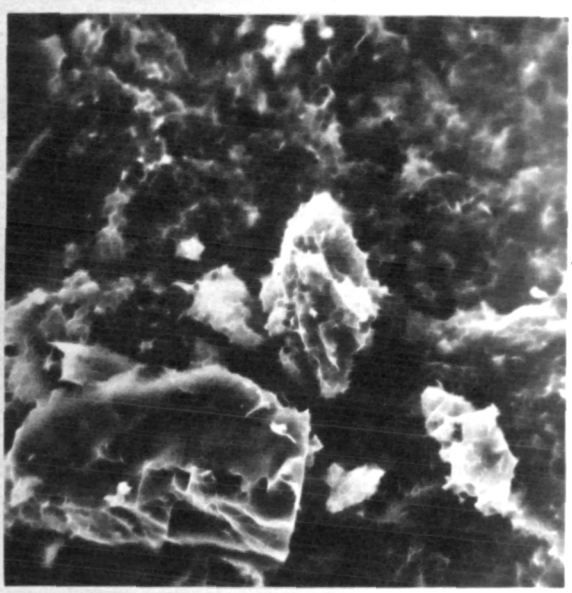
Magnification 2.30K 5μm

PLATE A1|9 - sections 29 & 30



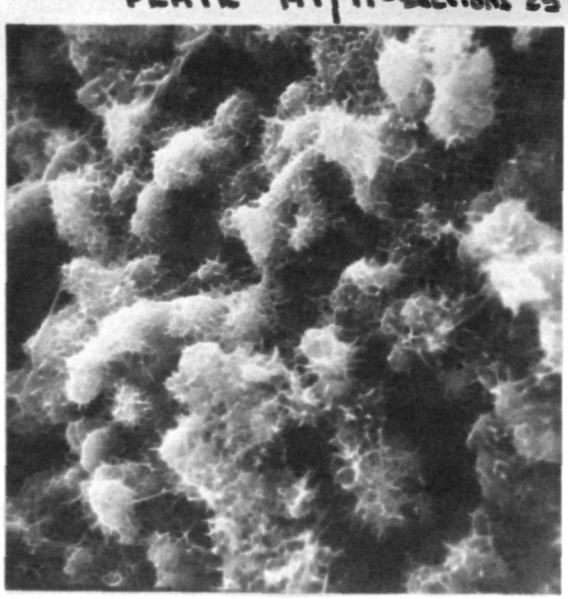
Magnification 2.08K 5μm

PLATE A1|10 - sections 29 & 30



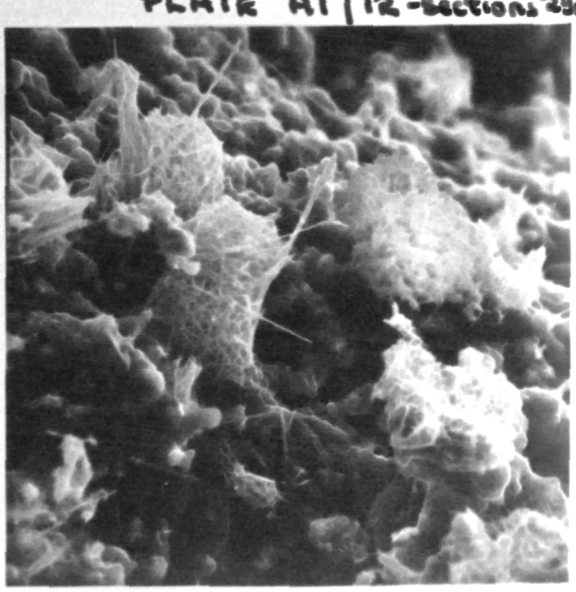
Magnification 1.02K 10μm

PLATE A1|11 - sections 29 & 30



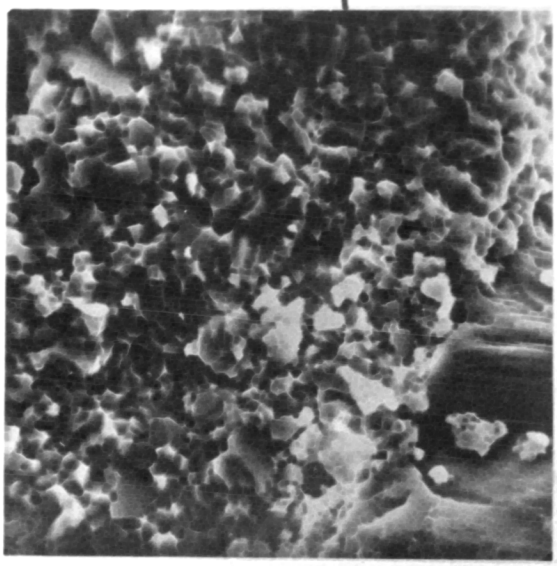
Magnification 2.06K 5μm

PLATE A1|12 - sections 29 & 30



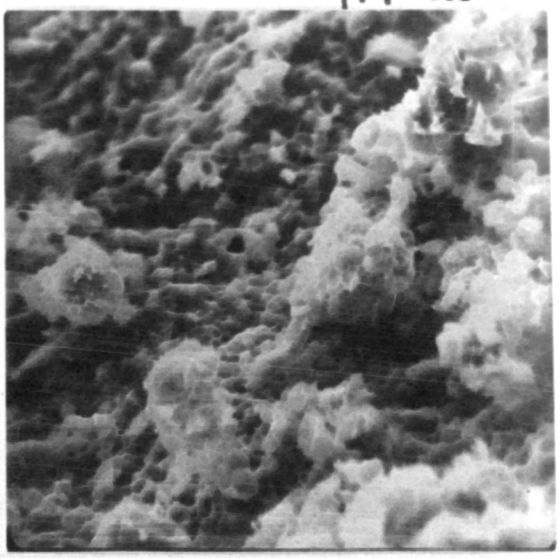
Magnification 1.05K 10μm

PLATE A1 | 13 - sections 37 & 38



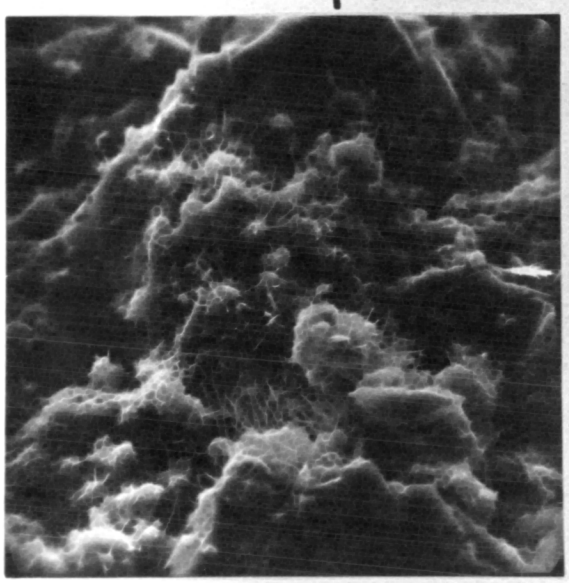
Magnification 1.04K 10μm

PLATE A1 | 14 - sections 43 & 44



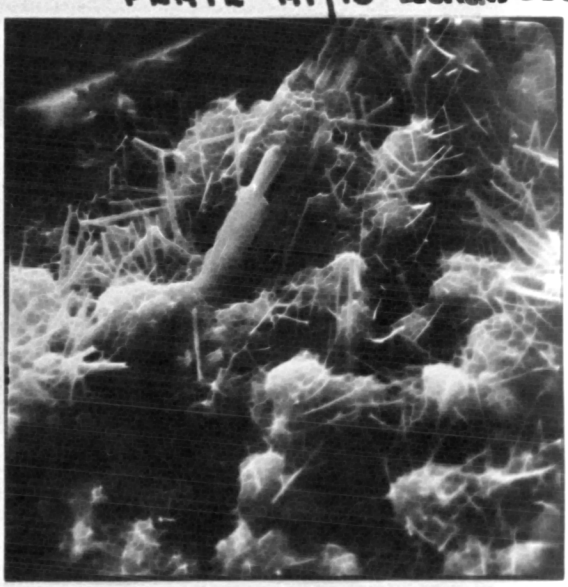
Magnification 1.05K 10μm

PLATE A1 | 15 - sections 53 & 54



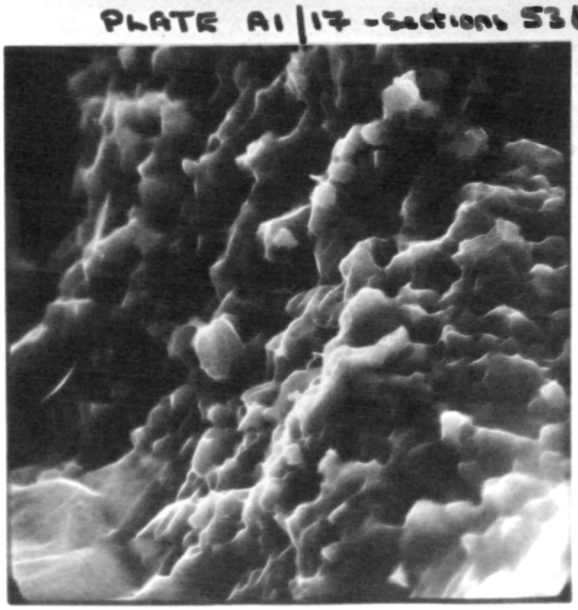
Magnification 1.05K 10μm

PLATE A1 | 16 - sections 53 & 54



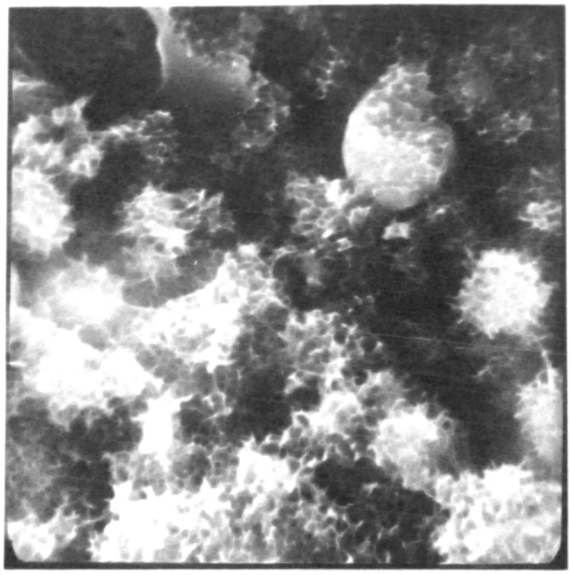
Magnification 2.24K 5μm

PLATE A1 | 17 - sections 53 & 54



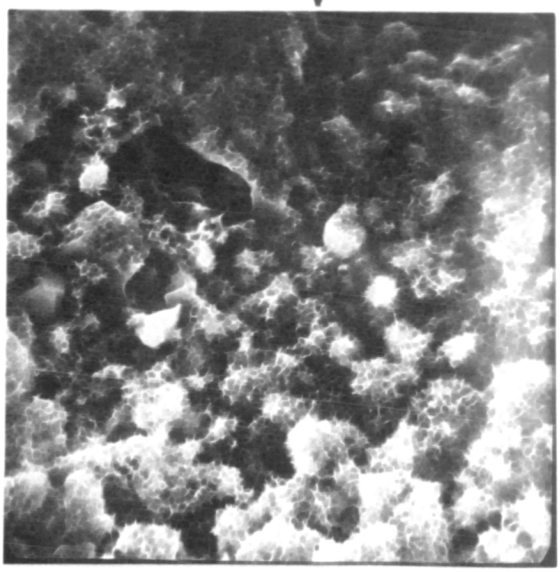
Magnification 2.37K 5μm

PLATE B2/1 - Section 3



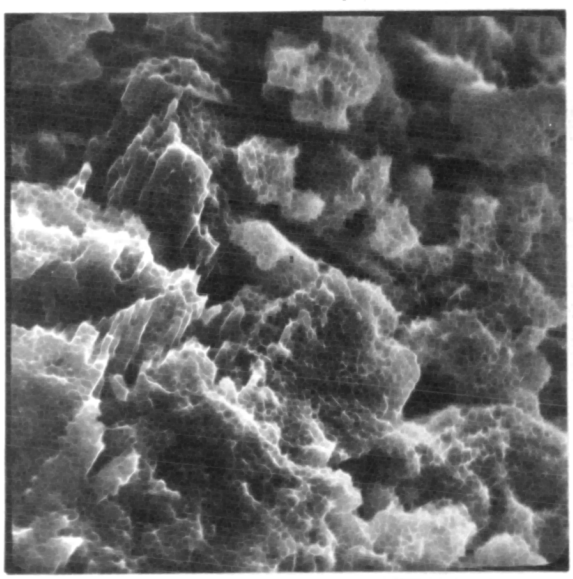
Magnification 4.71K 1μm

PLATE B2/2 - Section 3



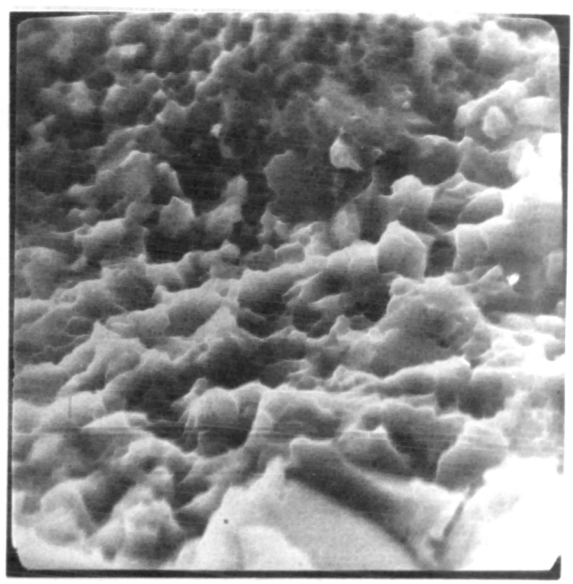
Magnification 1.89K 5μm

PLATE B2/3 - Section 3



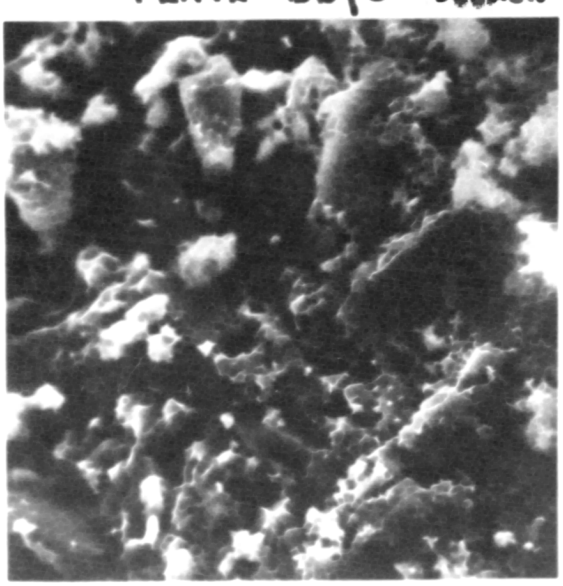
Magnification 1.89K 5μm

PLATE B/2/4 - Section 7



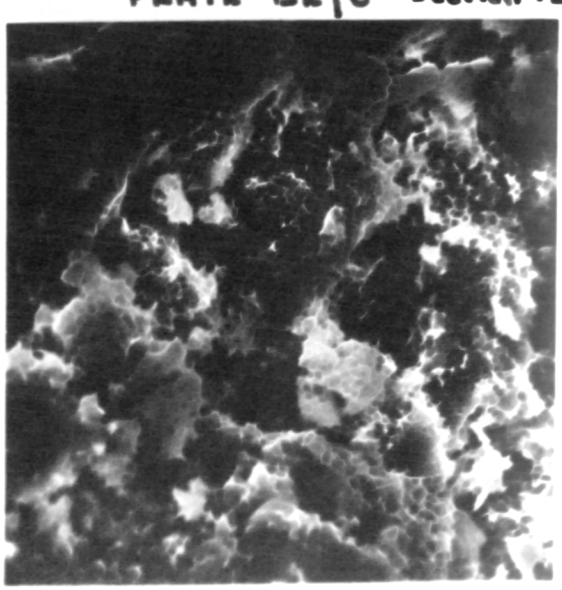
Magnification 2.18K 5μm

PLATE B2/5 - Section 15



Magnification 1.93K 5μm

PLATE B2/6 - Section 15

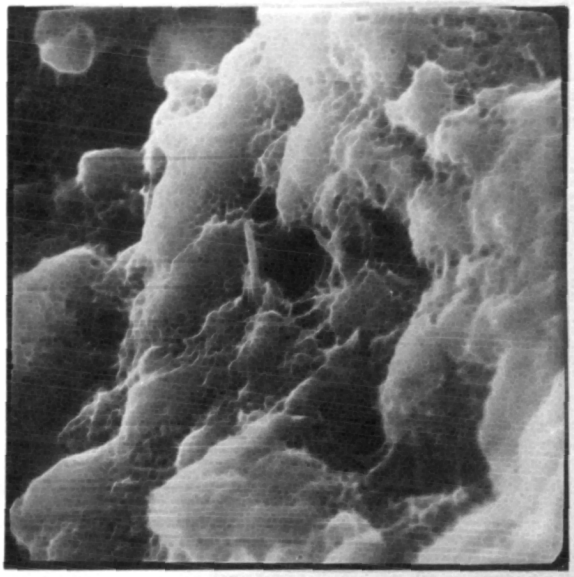


Magnification 1.81K 5μm

... of Sections, see page 326, Volume I

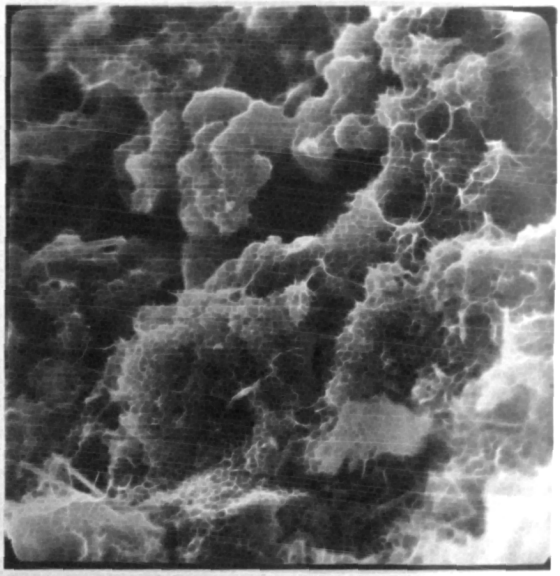
MIGRATION SERIES

PLATE B2/7 - Section 25



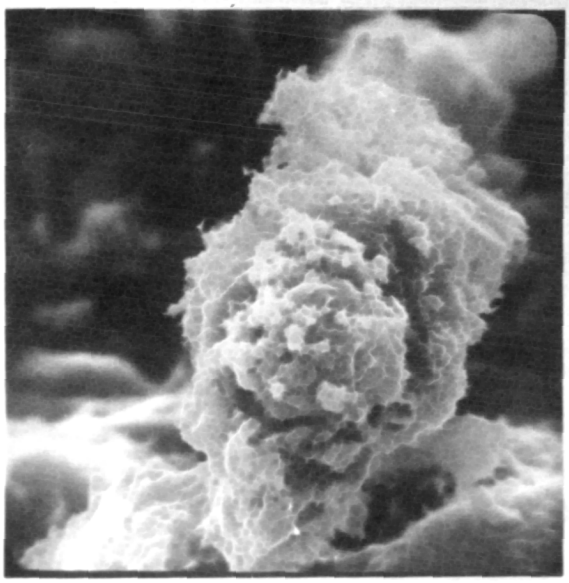
Magnification 5.57K 1μm

PLATE B2/8 - Section 25



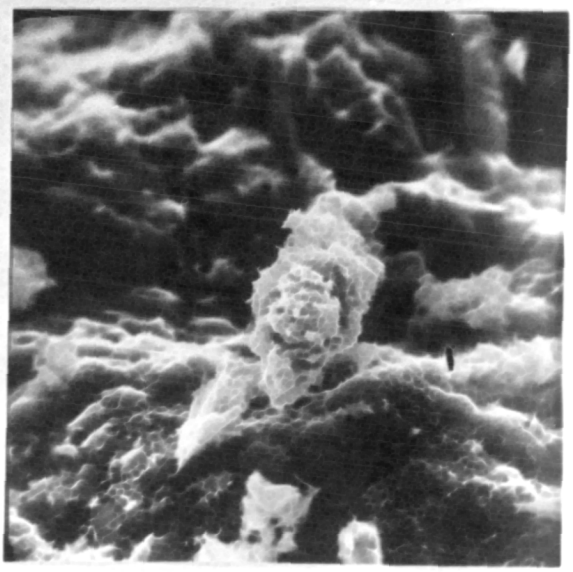
Magnification 2.18K 5μm

PLATE B2/9 - Sections 35&36



Magnification 4.45K 2μm

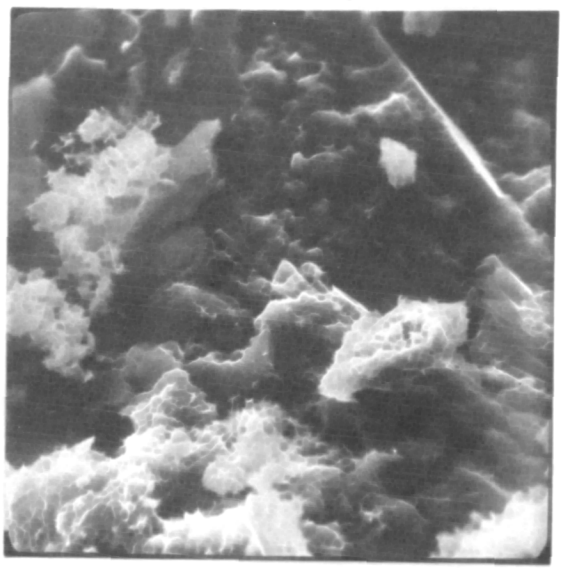
PLATE B2/10 - Sections 35&36



Magnification 1.78K 5μm

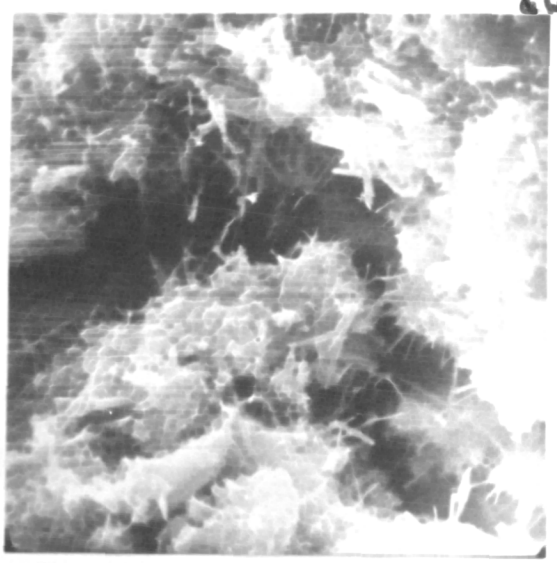
MIGRATION SERIES

PLATE B2/11 - sections 35 & 36



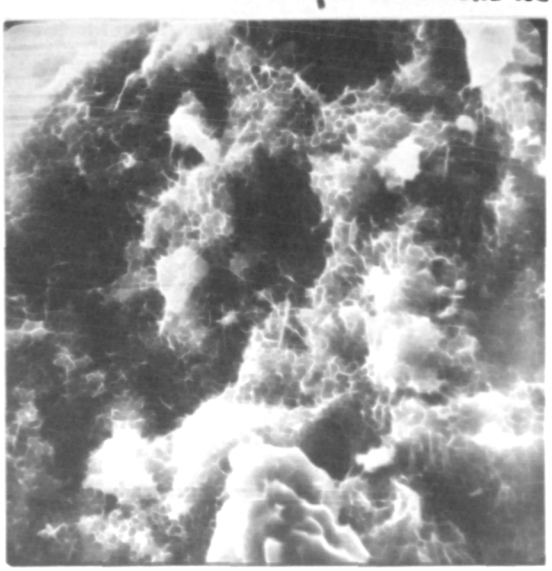
Magnification 1.86K 5μm

PLATE B2/12 - sections 48 & 49



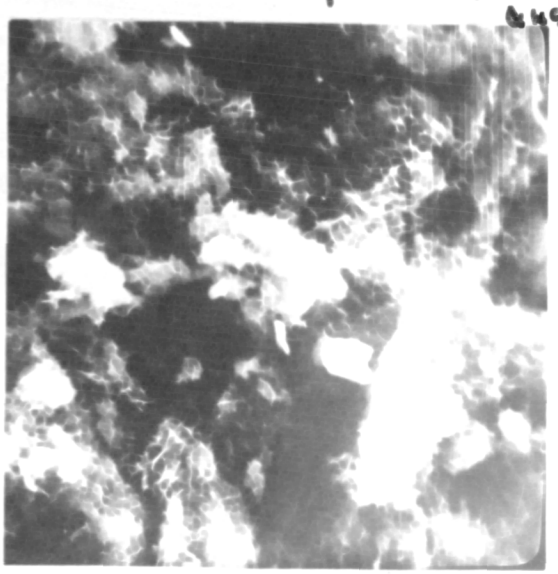
Magnification 5.12K 2μm

PLATE B2/13 - sections 48 & 49



Magnification 2.08K 5μm

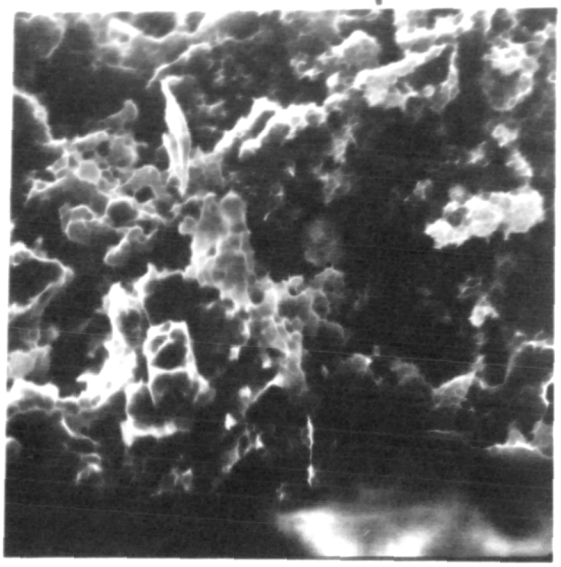
PLATE B2/14 - sections 48 & 49



Magnification 2.22K 5μm

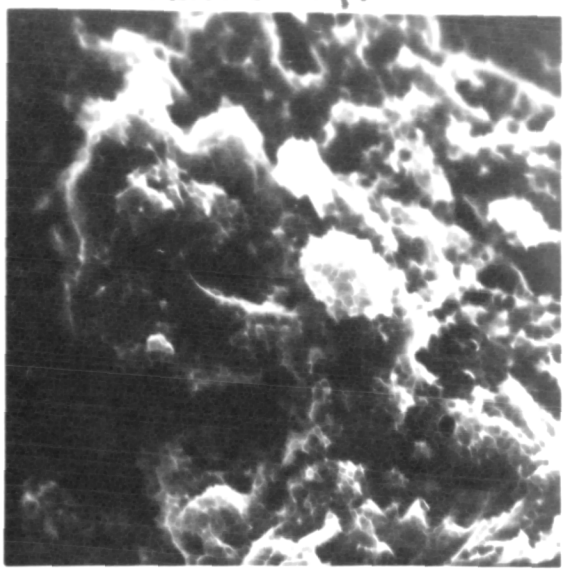
MIGRATION SERIES

PLATE C3|1 - Section 5



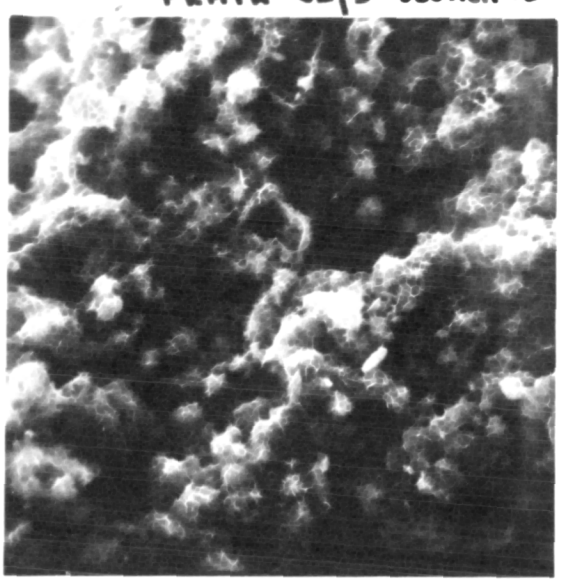
Magnification 1.11K 10μm

PLATE C3|2 - Section 15



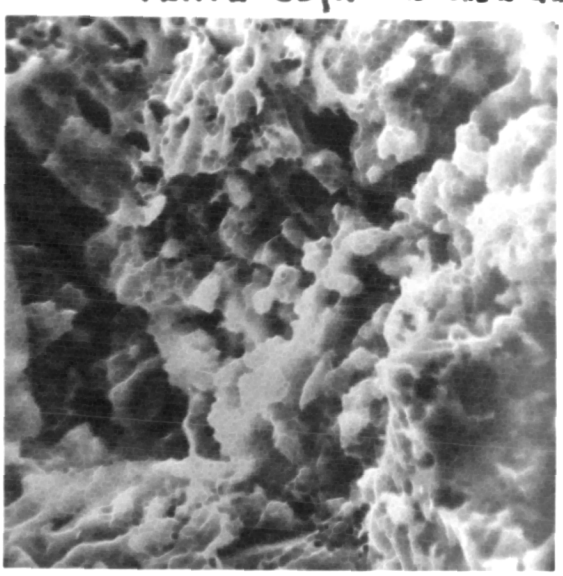
Magnification 1.16K 10μm

PLATE C3|3 - Section 15



Magnification 1.12K 10μm

PLATE C3|4 - Sections 21 & 22

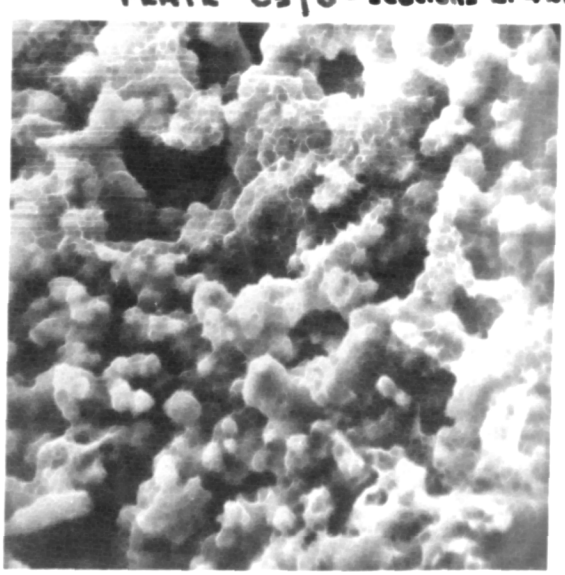


Magnification 1.12K 10μm

PLATE C3|5 - Sections 21 & 22

Magnification 560x 10μm

PLATE C3|6 - Sections 21 & 22

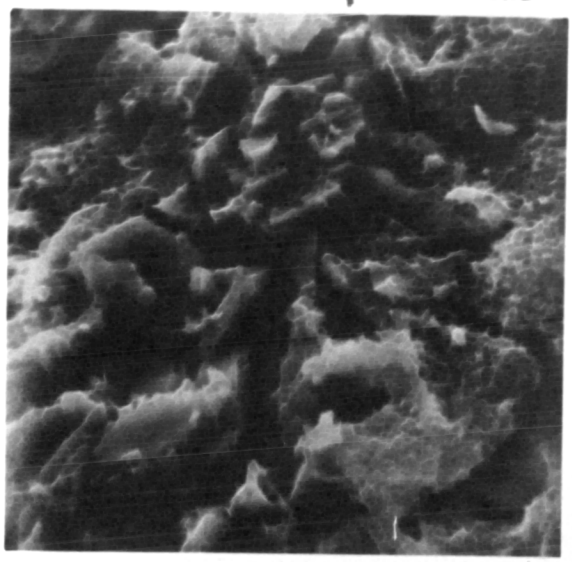


Magnification 2.24K 5μm

For listing of Sections, see page 330, Volume I

MIGRATION SERIES

PLATE C3|7 - Sections 21 & 22

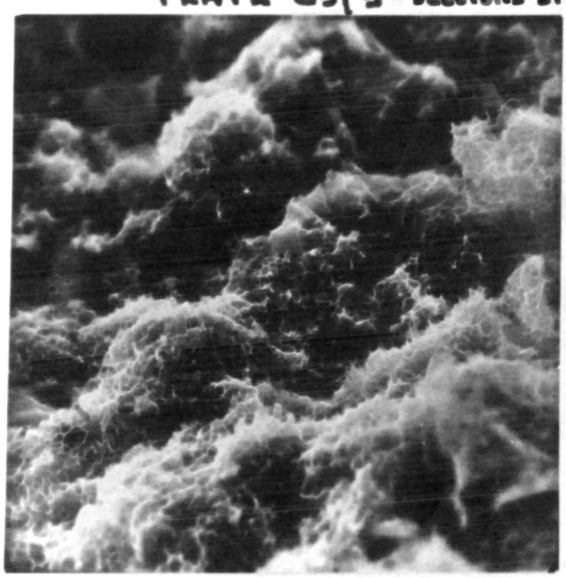


Magnification 2.27K 5μm

PLATE C3|8 - Sections 31 & 3

Magnification 6.19K 1μm

PLATE C3|9 - Sections 31 & 32



Magnification 2.11K 5μm

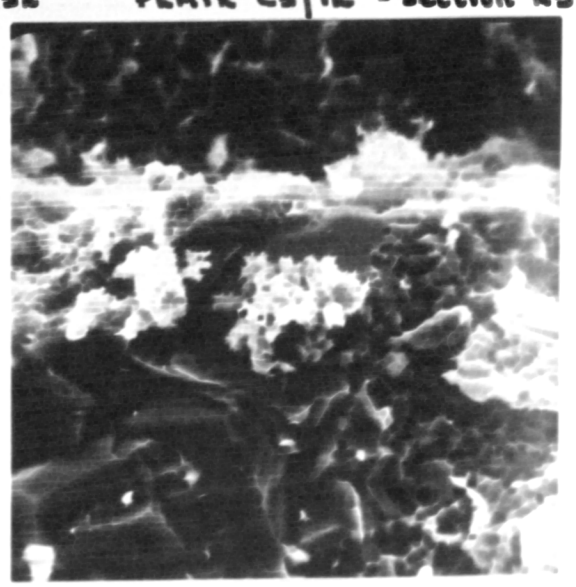
PLATE C3|10 - Sections 31 & 32

Magnification 1.24K 10μm

PLATE C3|11 - Sections 31 & 32

Magnification 2.42K 5μm

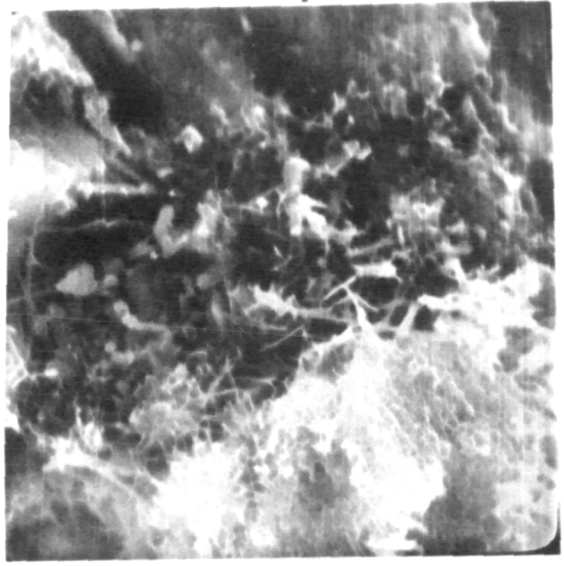
PLATE C3|12 - Section 49



Magnification 942 x 10μm

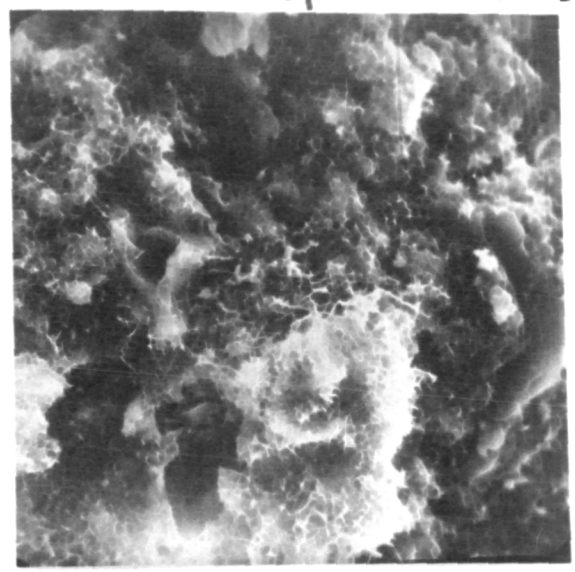
MIGRATION SERIES

PLATE C3/13 - Section 49



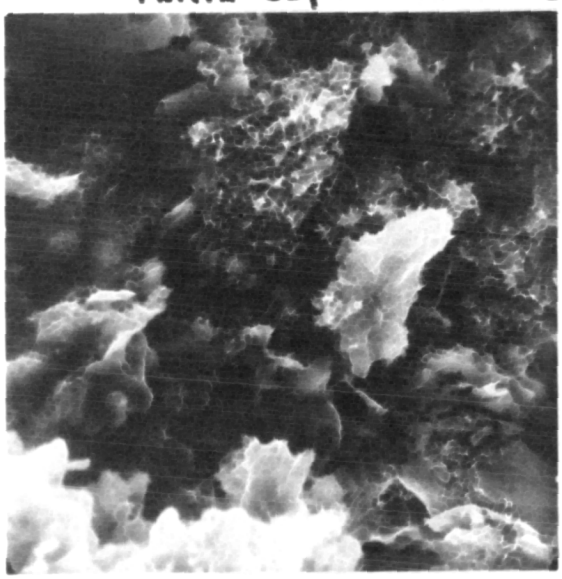
Magnification 4.68K 2μm

PLATE C3/14 - Section 49



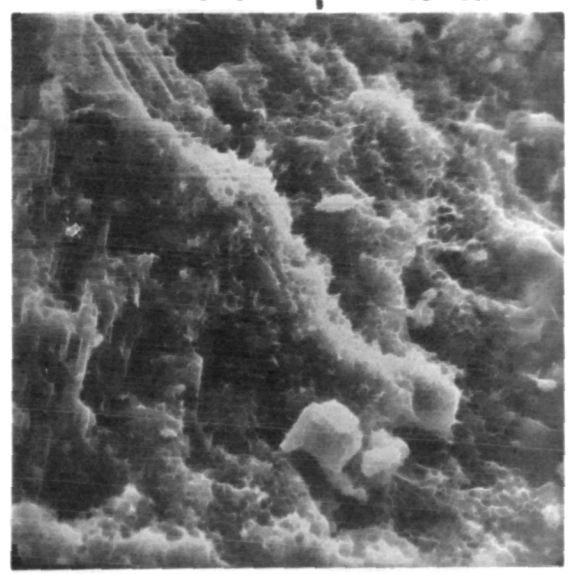
Magnification 1.86K 5μm

PLATE C3/15 - Section 49



Magnification 1.85K 5μm

PLATE C3/16 - Sections 58 & 59



Magnification 1.76K 5μm

PLATE C3/17 - Sections 58 & 59

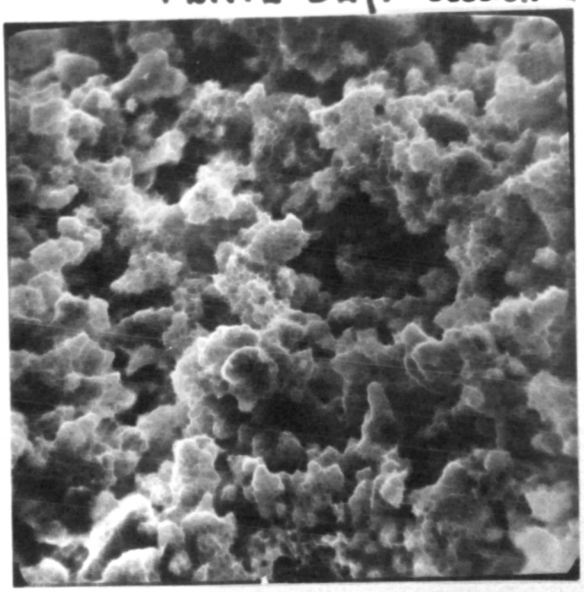
Magnification 1.78K 5μm

PLATE C3/18 - Sections 58 & 59

Magnification 1.05K 10μm

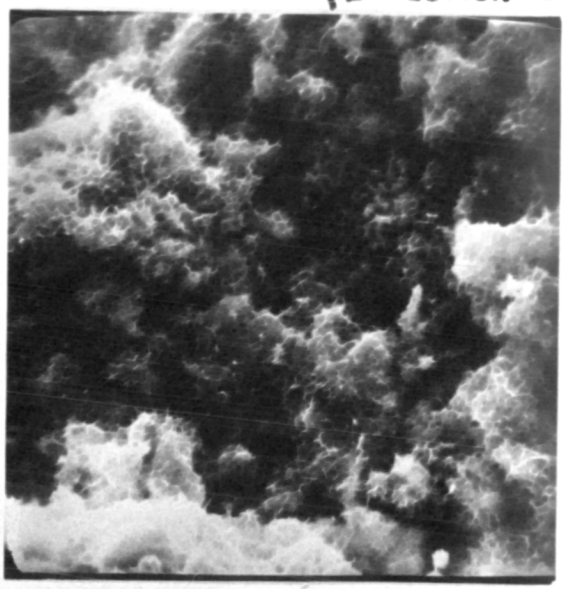
MIGRATION SERIES

PLATE DH|1 - Section 13



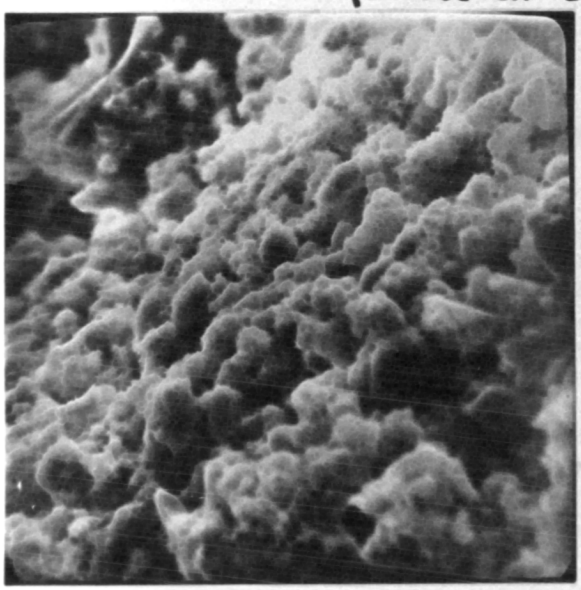
Magnification 891 x 10µm

PLATE DH|2 - Section 13



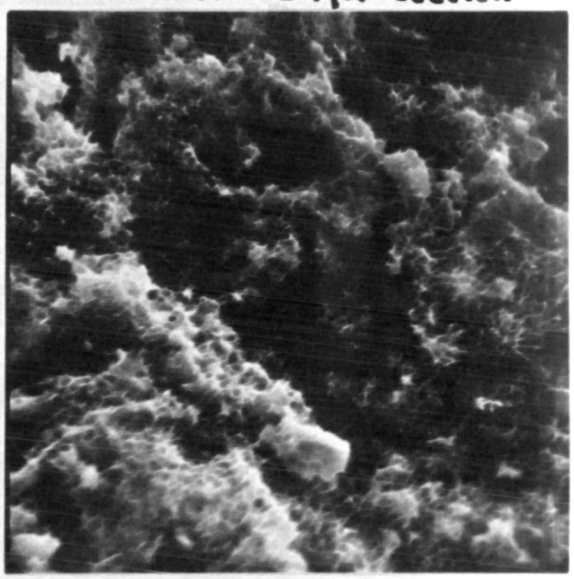
Magnification 1.81K 5µm

PLATE DH|3 - Section 13



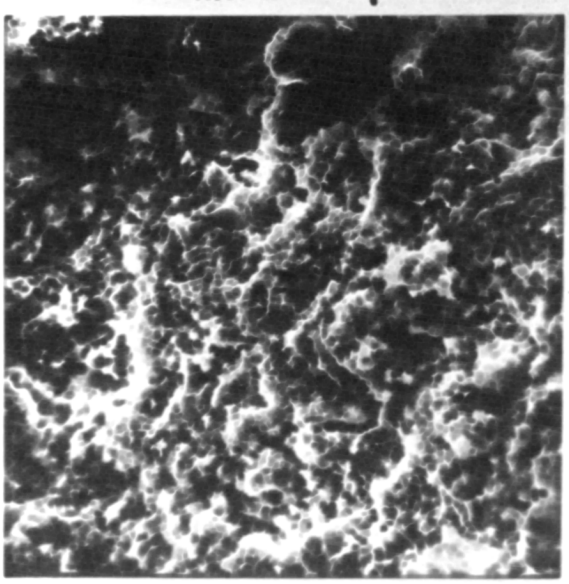
Magnification 993x 10µm

PLATE DH|4 - Section 15



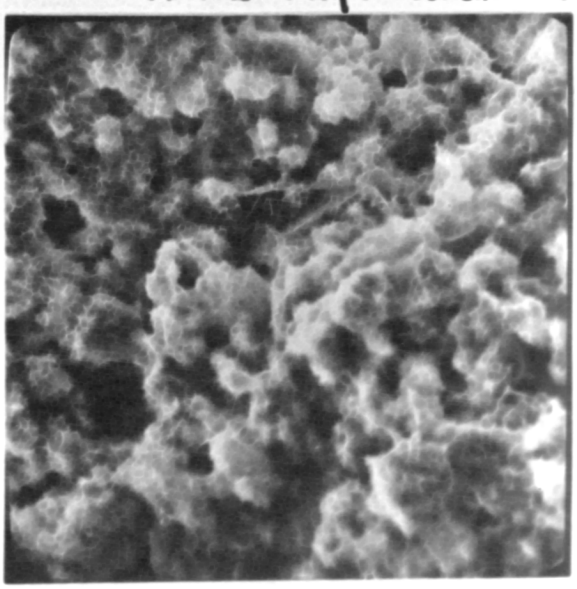
Magnification 1.93K 5µm

PLATE DH|5 - Section 15



Magnification 480x 20µm

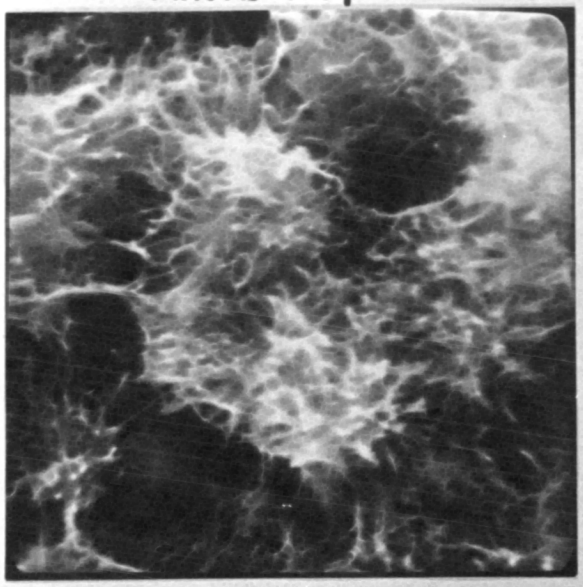
PLATE DH|6 - Section 25&26



Magnification 960x 10µm

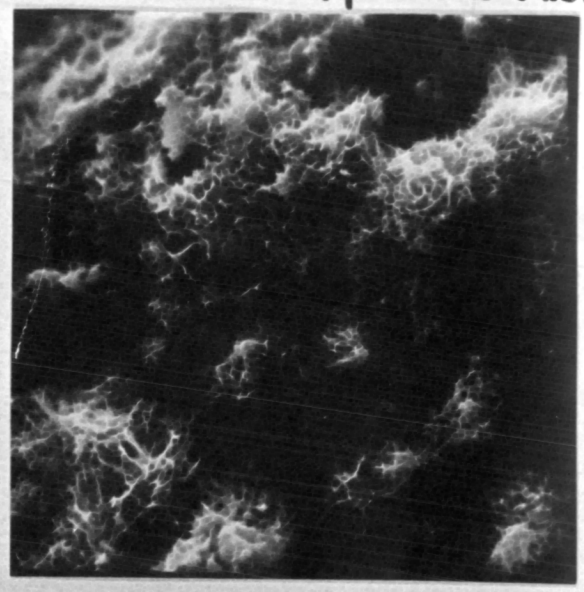
Listing of Sections, see page 385, Volume I

PLATE DH|7-sections 25&26



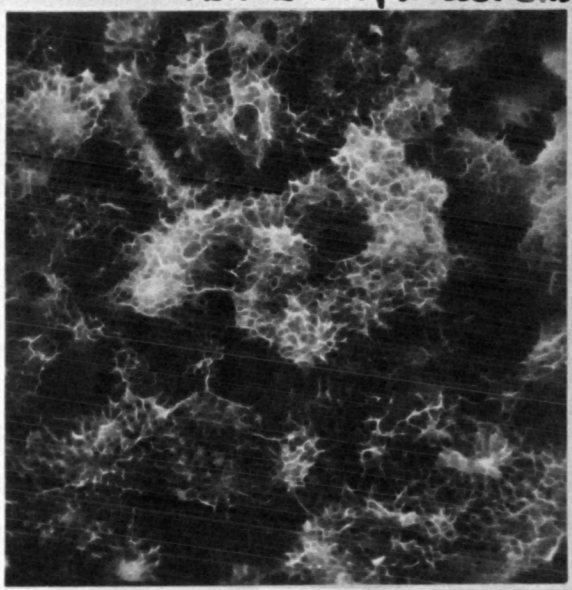
Magnification 4.68K 2μm

PLATE DH|8-sections 25&2



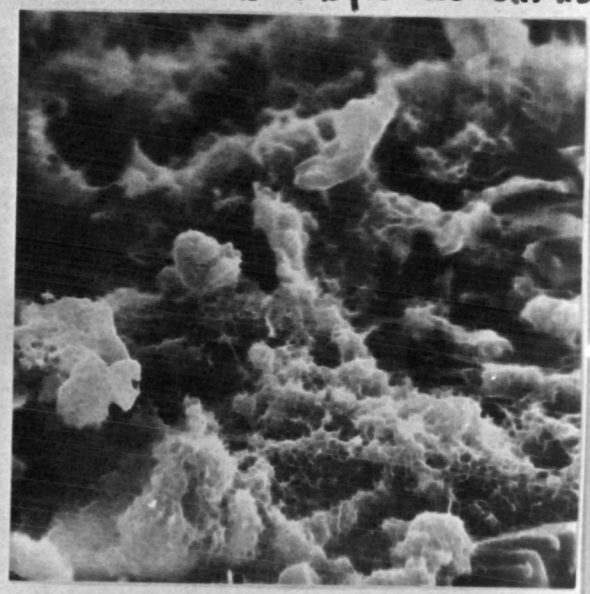
Magnification 2.30K 5μm

PLATE DH|9-sections 25&26



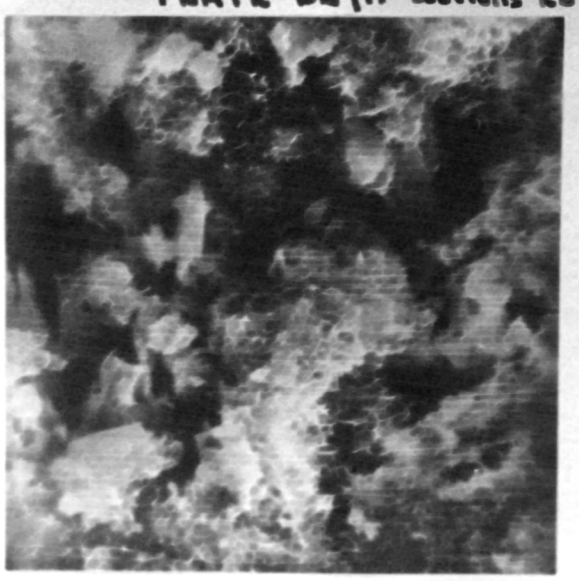
Magnification 1.86K 5μm

PLATE DH|10-sections 25&2



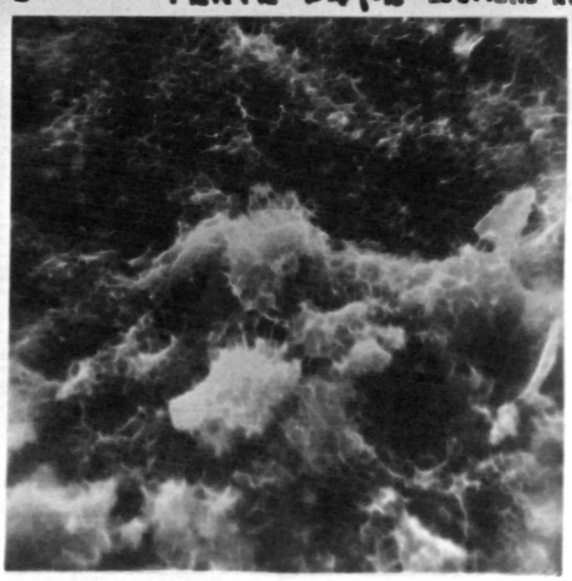
Magnification 1.93K 5μm

PLATE DH|11-sections 28&29



Magnification 2.38K 5μm

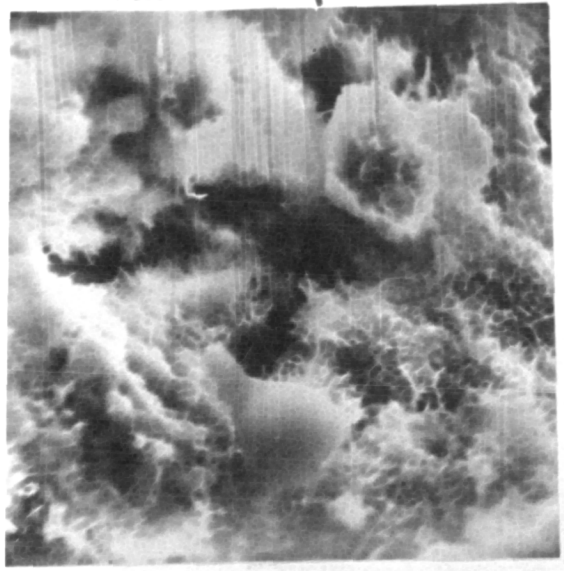
PLATE DH|12-sections 28& 29



Magnification 2.39K 5μm

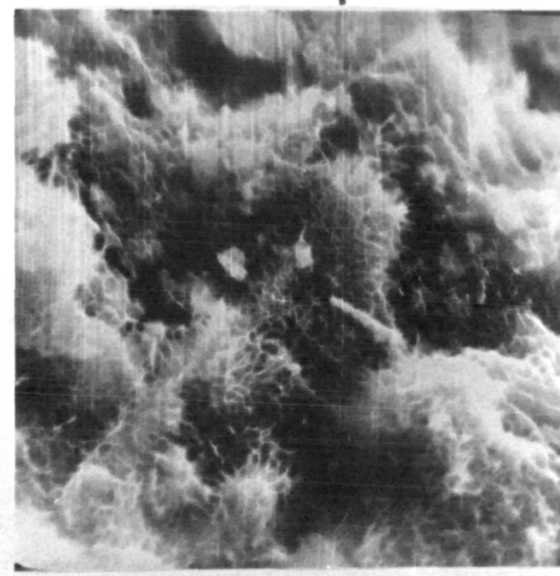
MIGRATION SERIES

PLATE DH|13 - sections 35&36



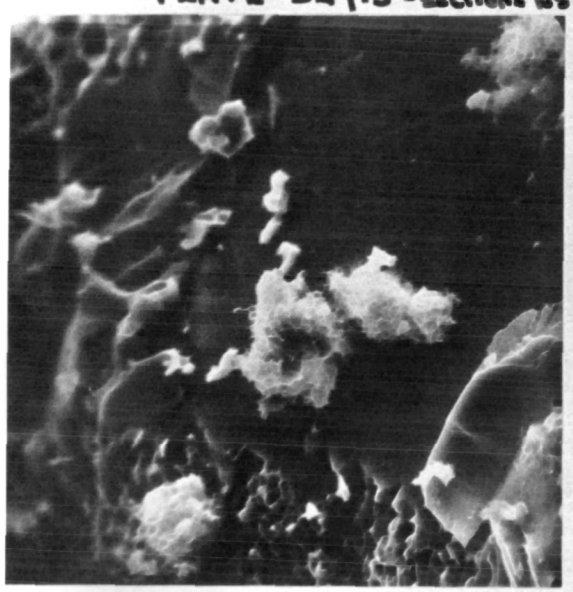
Magnification 2.39K 5μm

PLATE DH|14 - sections 35&36



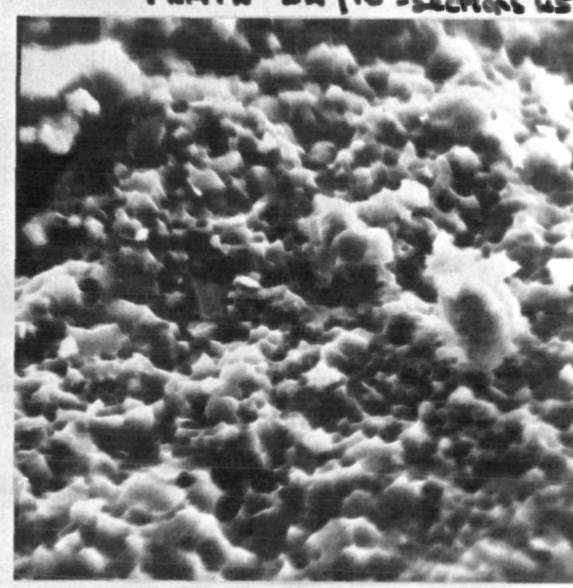
Magnification 2.53K 5μm

PLATE DH|15 - sections 45&46



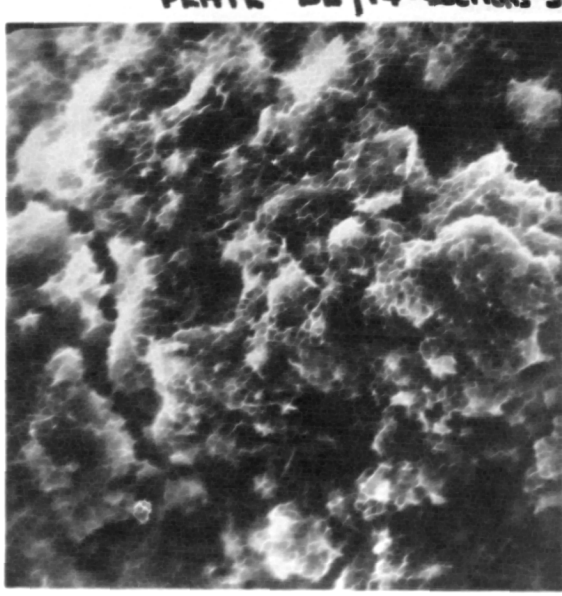
Magnification 968x 10μm

PLATE DH|16 - sections 45&46



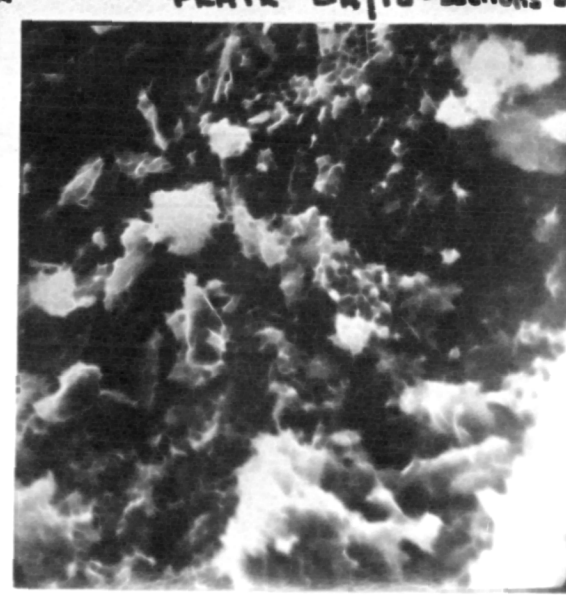
Magnification 1.32K 10μm

PLATE DH|17 - sections 53&54



Magnification 1.23K 10μm

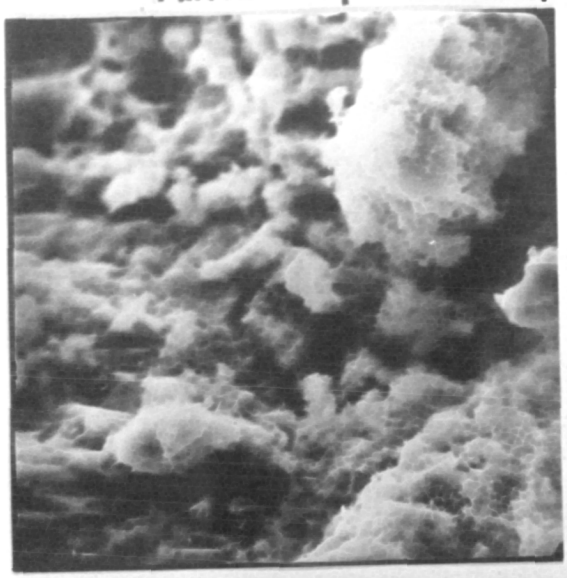
PLATE DH|18 - sections 53&54



Magnification 1.26K 10μm

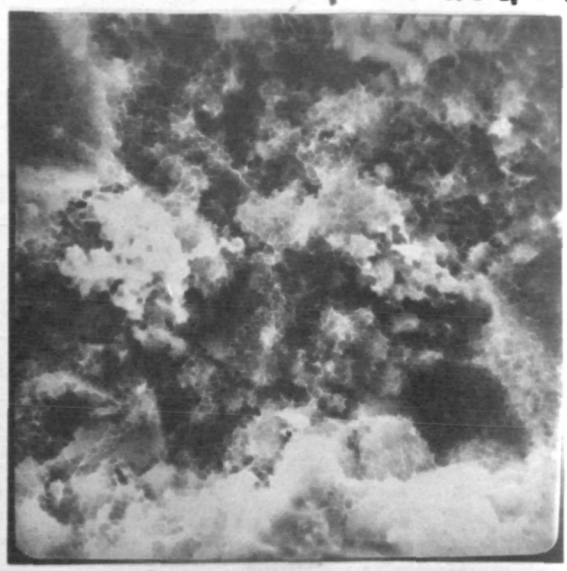
MIGRATION SERIES

PLATE E5|1 - sections 9, 10 & 11



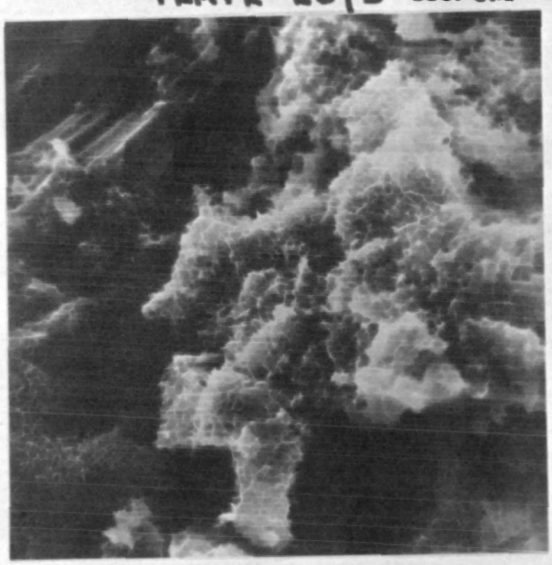
Magnification 1.24K 10μm

PLATE E5|2 - sections 9, 10 & 11



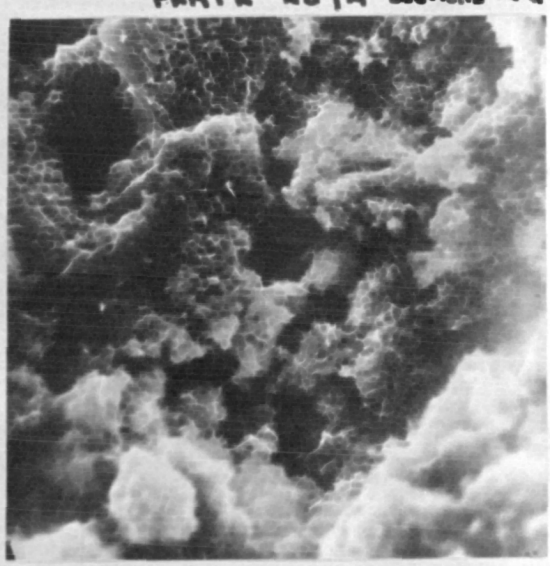
Magnification 1.29K 10μm

PLATE E5|3 - sections 18 & 19



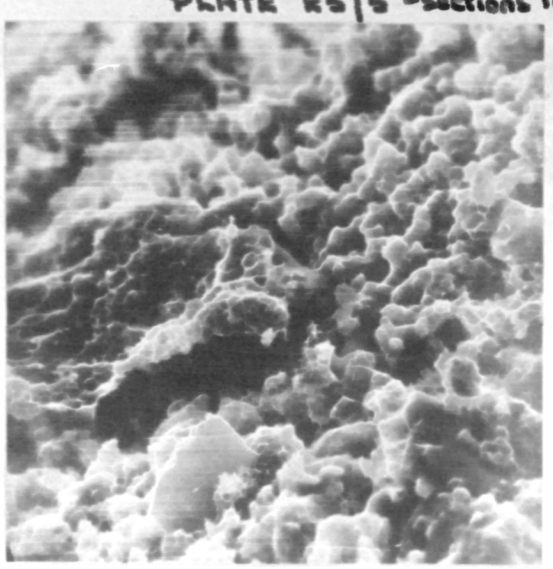
Magnification 2.06K 5μm

PLATE E5|4 - sections 18 & 19



Magnification 2.10K 5μm

PLATE E5|5 - sections 18 & 19



Magnification 1.07K 10μm

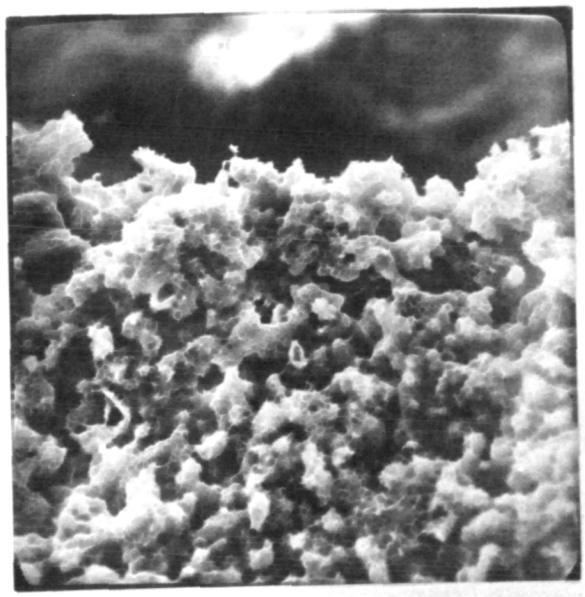
PLATE E5|6 - sections 26, 27 &

Magnification 965x 10μm

For listing of Sections, see page 339, Volume I

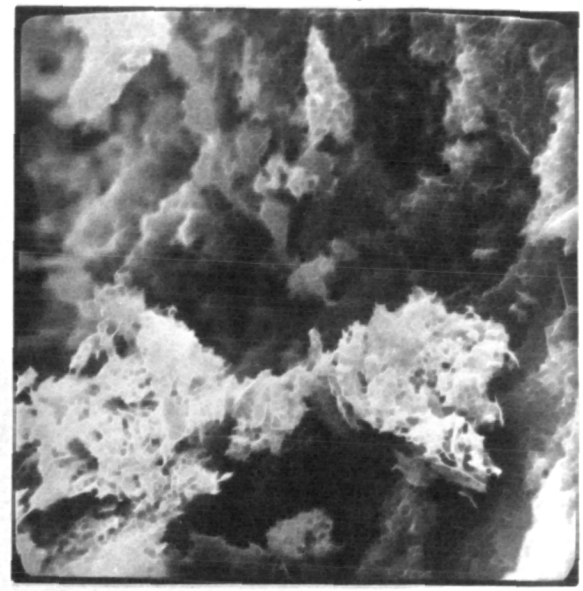
MIGRATION SERIES

PLATE E5|7 - sections 30 & 31



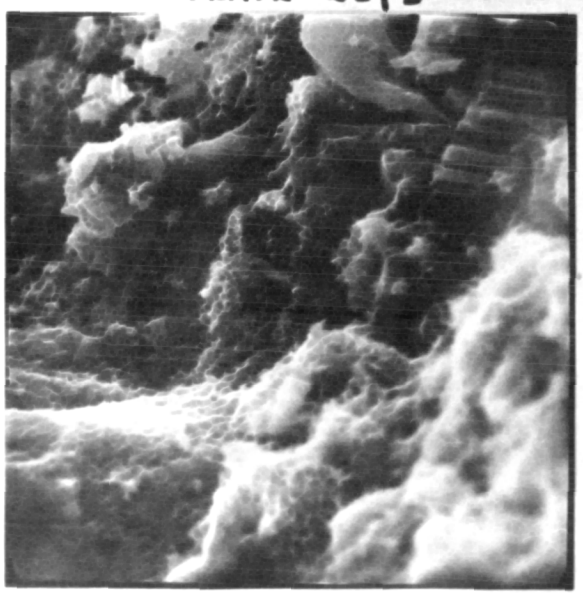
Magnification 1.02K 10μm

PLATE E5|8 - sections 30 & 31



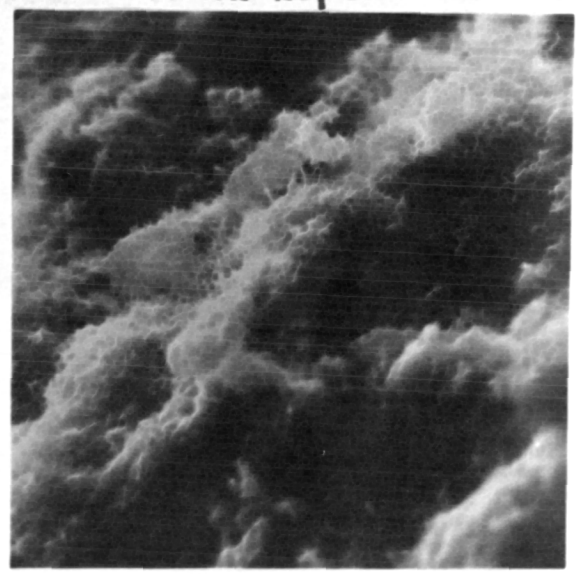
Magnification 2.10K 5μm

PLATE E5|9 - sections 30 & 31



Magnification 2.21K 5μm

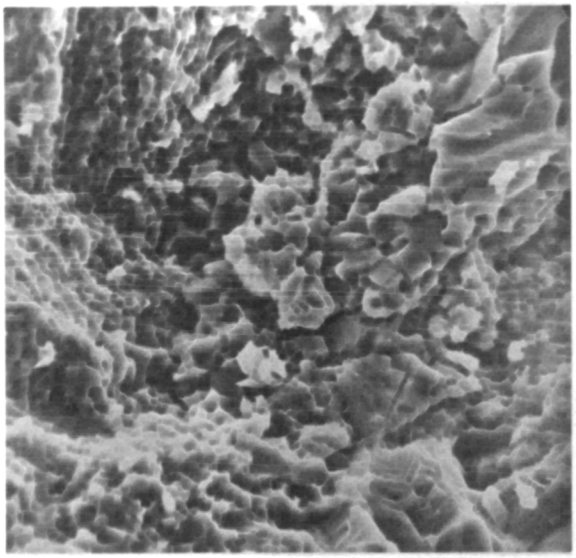
PLATE E5|10 - section 40 & 41



Magnification 2.40K 5μm

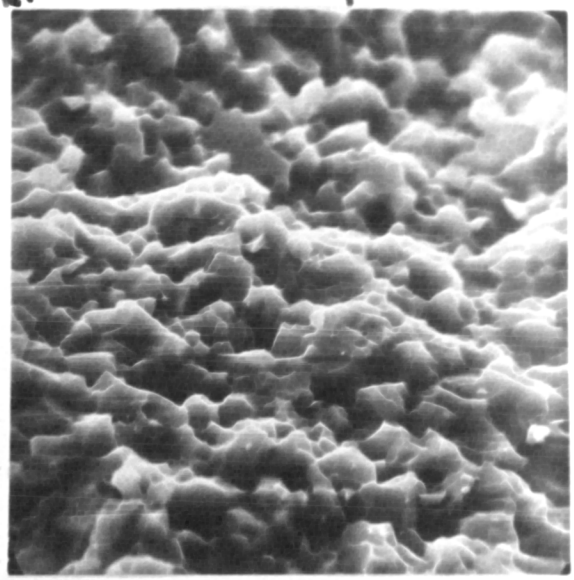
MIGRATION SERIES

PLATE ES|11 - sections 40 & 41



Magnification 839x 10μm

PLATE ES|12 - sections 58 & 59



Magnification 2.21K 5μm

PLATE ES|13 - sections 58 & 59

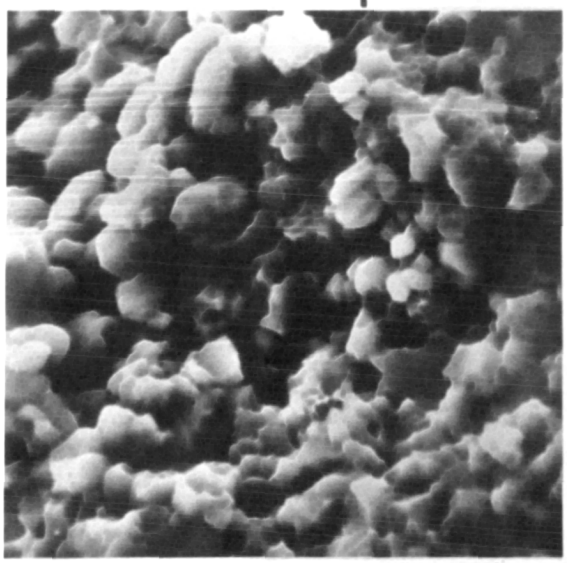
Magnification 1.11K 10μm

PLATE ES|14 - sections 58 & 59

Magnification 1.14K 10μm

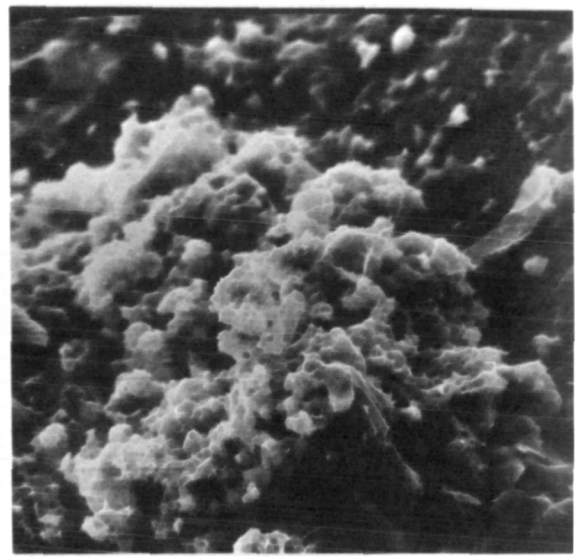
MIGRATION SERIES

PLATE L12/1 - sections 9 & 10



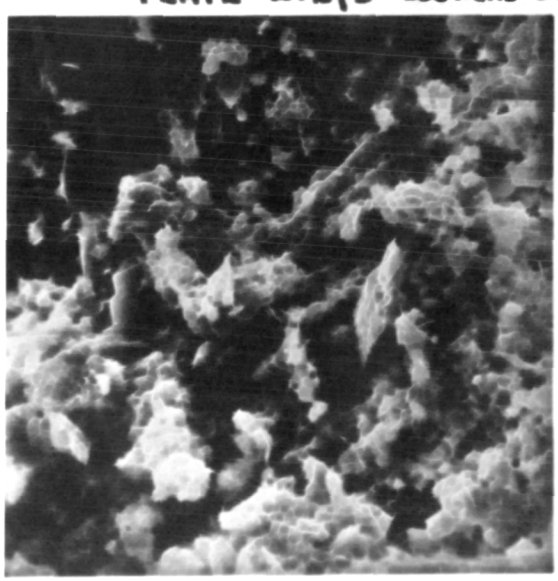
Magnification 2.36K 5μm

PLATE L12/2 - sections 32 & 33



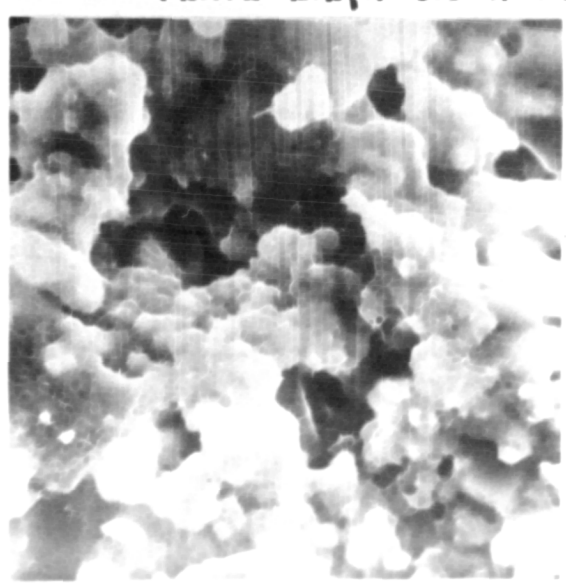
Magnification 9.9K 10μm

PLATE L12/3 - sections 32 & 33



Magnification 1.02K 10μm

PLATE L12/4 - section 56

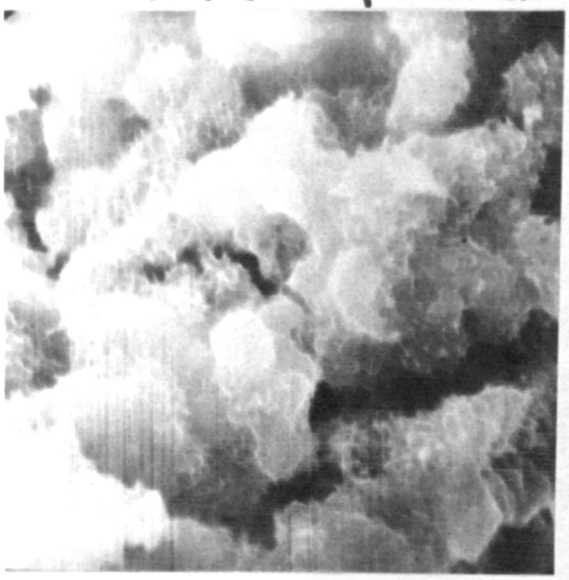


Magnification 1.81K 5μm

For listing of Sections, see page 342, Volume I

MIGRATION SERIES

PLATE M12/5 - section 56

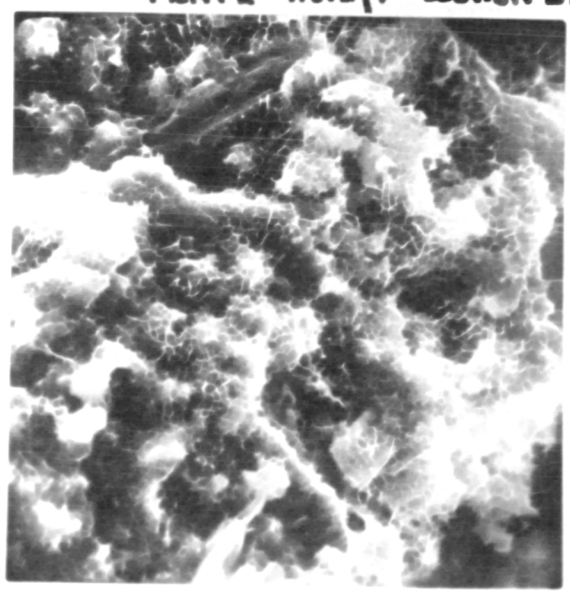


Magnification 4.60K 2μm

PLATE M12/6 - section 56

Magnification 4.57K 2μm

PLATE M13/1 - section 32



Magnification 1.76K 5μm

CHAPTER SEVEN AND APPENDIX III - FIGURES.

FIGURES FOR CHAPTER SEVEN.

Figure 7:1 - Temperature Distributions for Venting Test Specimens run at various Base Temperatures.

Figure 7·2 - Temperature Distributions for Specimens F6, G7 and H8, run at a nominal base temperature of 150°C.

Figure 7.3 - Evaporable water contents from Moisture Meter readings at various instrumentation positions against time of heating for Specimen J10.

Figure 7:4 - Phase Diagram for water in Specimen J10 at the end of time of heating of 296 days.

Figure 7·5 - Comparison of Evaporable water distributions obtained by the Gravimmetric method and from the final moisture meter readings for Specimen J10.

Figure 7 6 - Evaporable water Distributions at various ages of heating for Specimen J10.

Figure 7.7 - Total water content distributions for Specimens vented at the start of heating after 25 days' heating.

Figure 7:8 - Total water content distributions for specimens vented at the start of heating after 50 days' heating.

Figure 7:9 - Total water content distributions for Specimens F6, J10 and O15 after 100 days' heating.

Figure 7:10 - Total water content distributions for Specimens F6, J10, and O15 after 150 days' heating.

Figure 7 11 - Final water distributions for specimens vented at start of heating, determined by Gravimmetric measurement at the end of heating.

Figure 7:12 - Graph of Weight Loss against time of heating for Specimens tested at various base temperatures and vented at the start of heating.

Figure 7:39 - Comparison of the total water content distributions of specimens D4 and N14 at various times of heating, both with a nominal base temperature of 175°C.

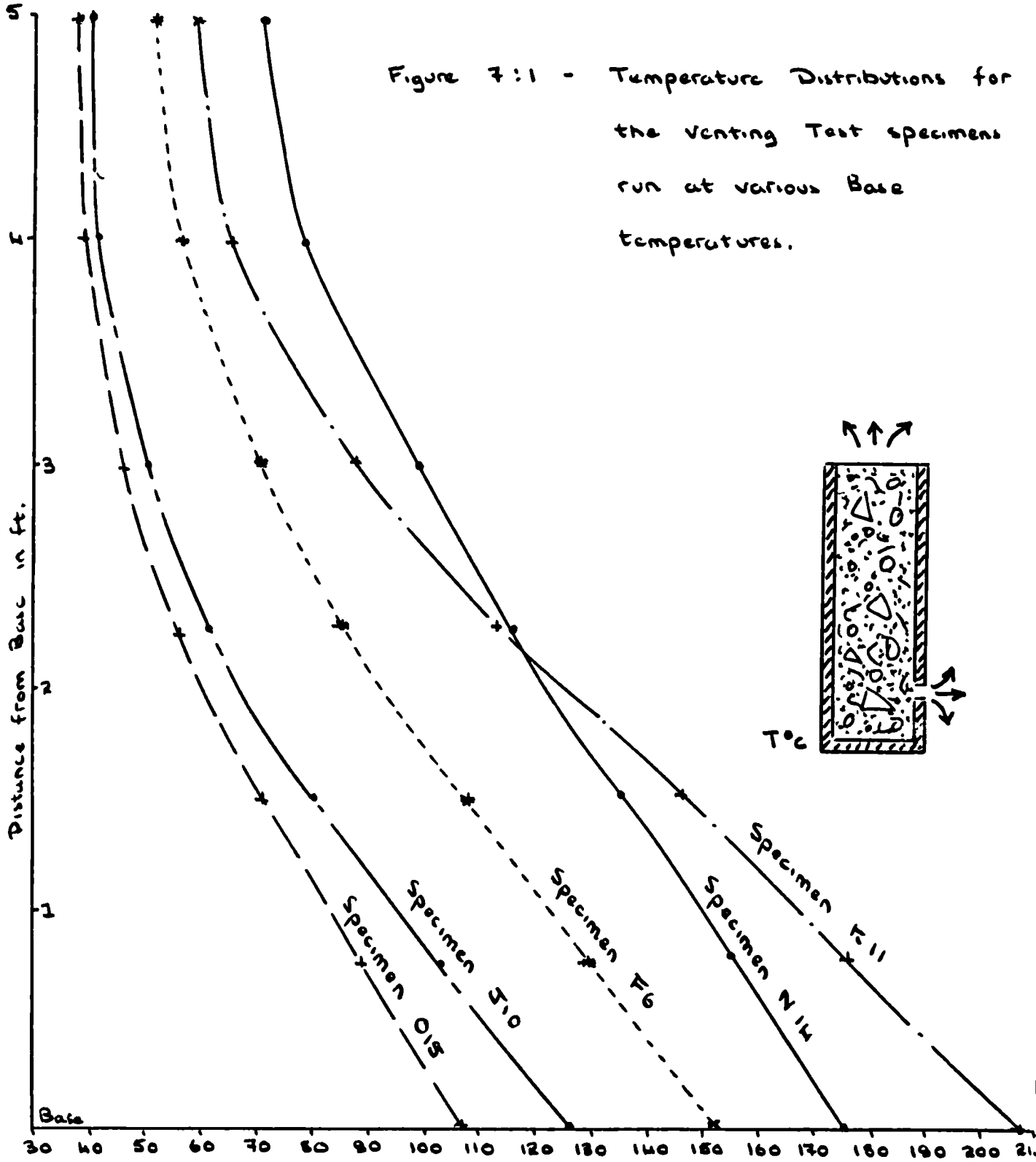
Figure 7·40 - Comparison of the Gauge Pore Pressure Distributions in Specimens D4 and N14 at various times of heating, both with a nominal base temperature of 175°C.

Figure 7:41 - Comparison of the Temperature Gradients applied to Specimens E5 and K11, both with a nominal base temperature of 200°C.

Figure 7:42 - Comparison of the total water content distributions of specimens E5 and K11 at various times of heating, both with a nominal base temperature of 200°C.

Figure 7·43 - Comparison of the Gauge Pore Pressure distributions in specimens E5 and K11 at various times of heating, both with a nominal base temperature of 200°C.

Figure 7:1 - Temperature Distributions for the Venting Test specimens run at various Base temperatures.



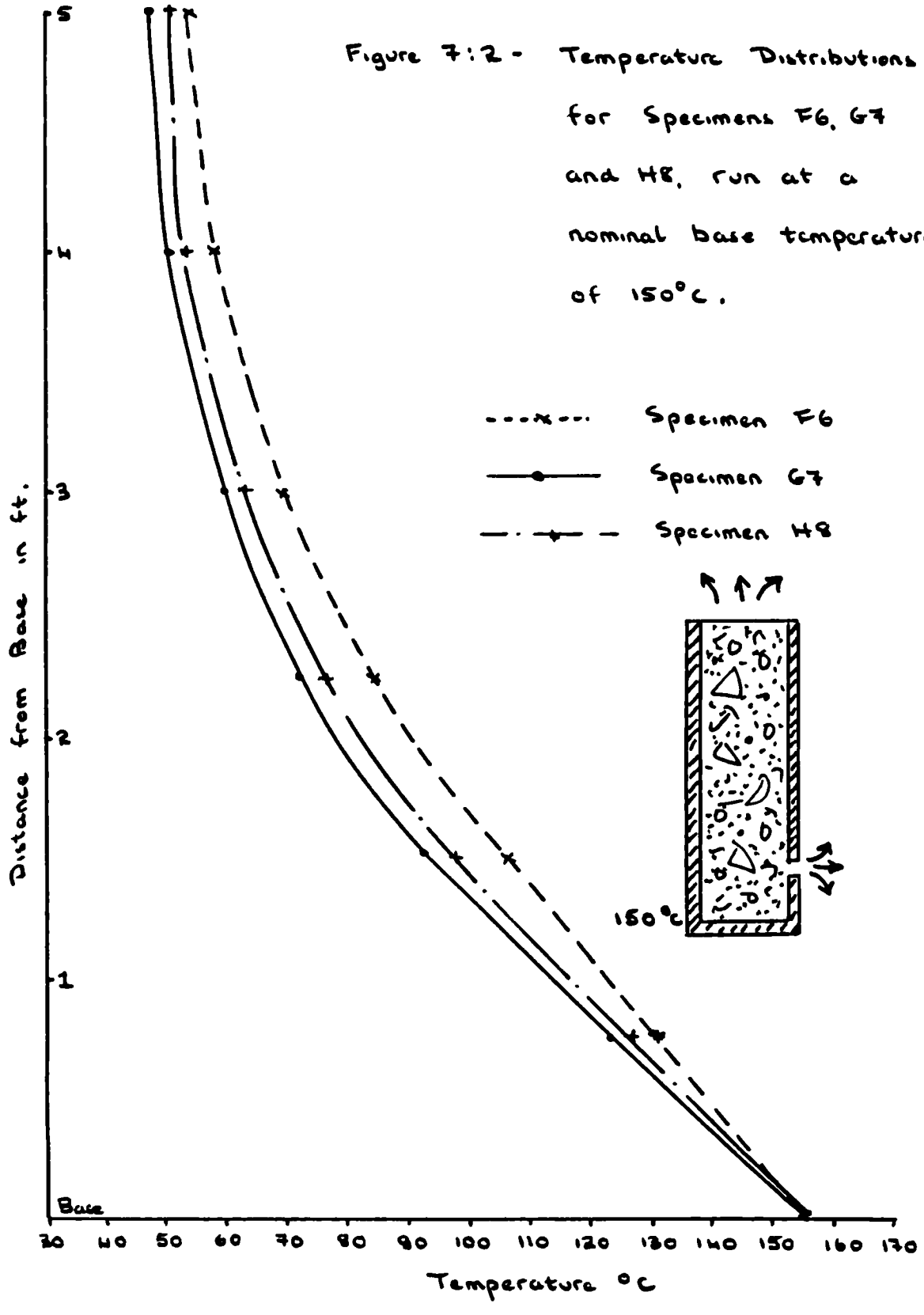


Figure 7:2 - Temperature Distributions for Specimens F6, G7 and H8, run at a nominal base temperature of 150°C.

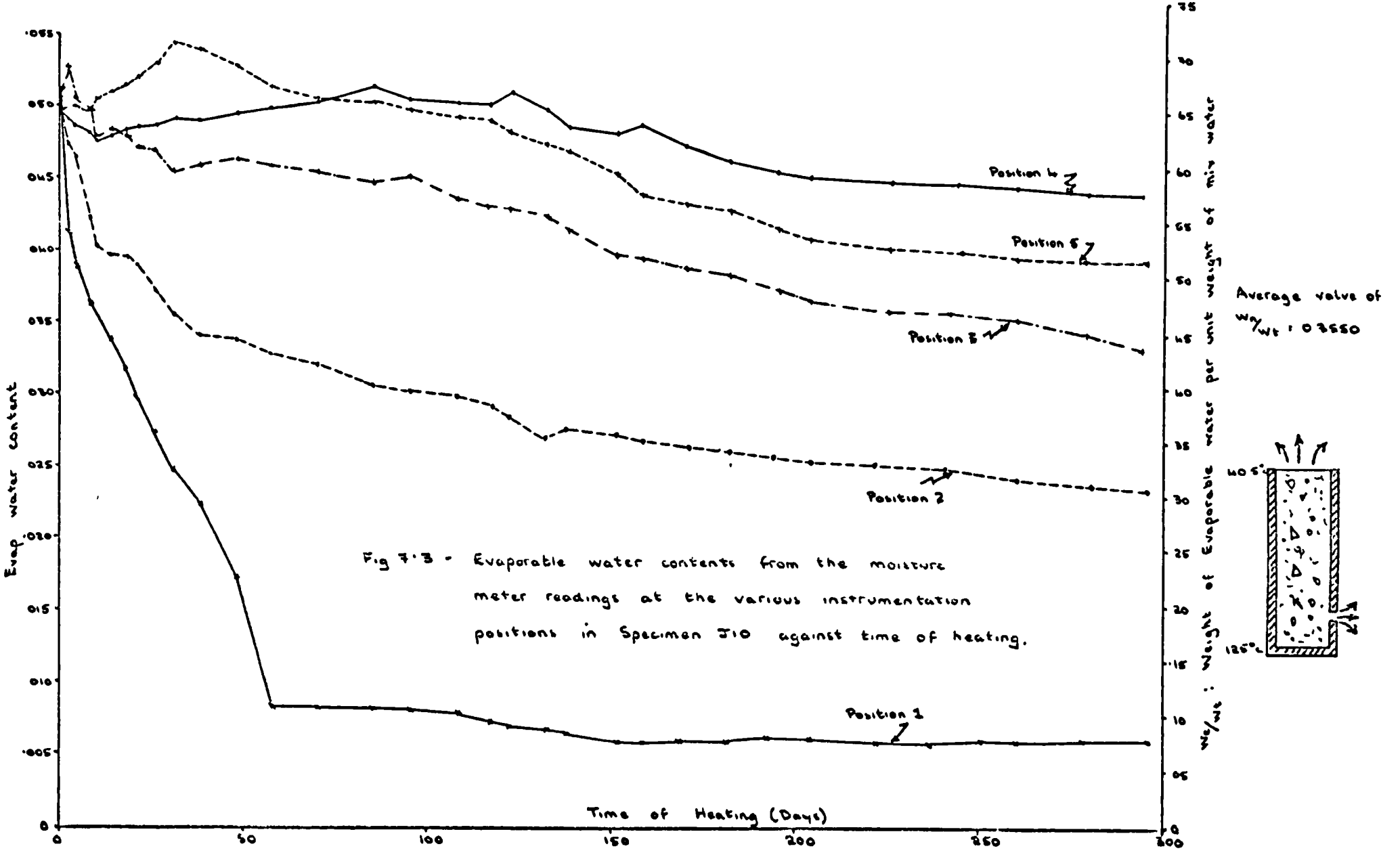
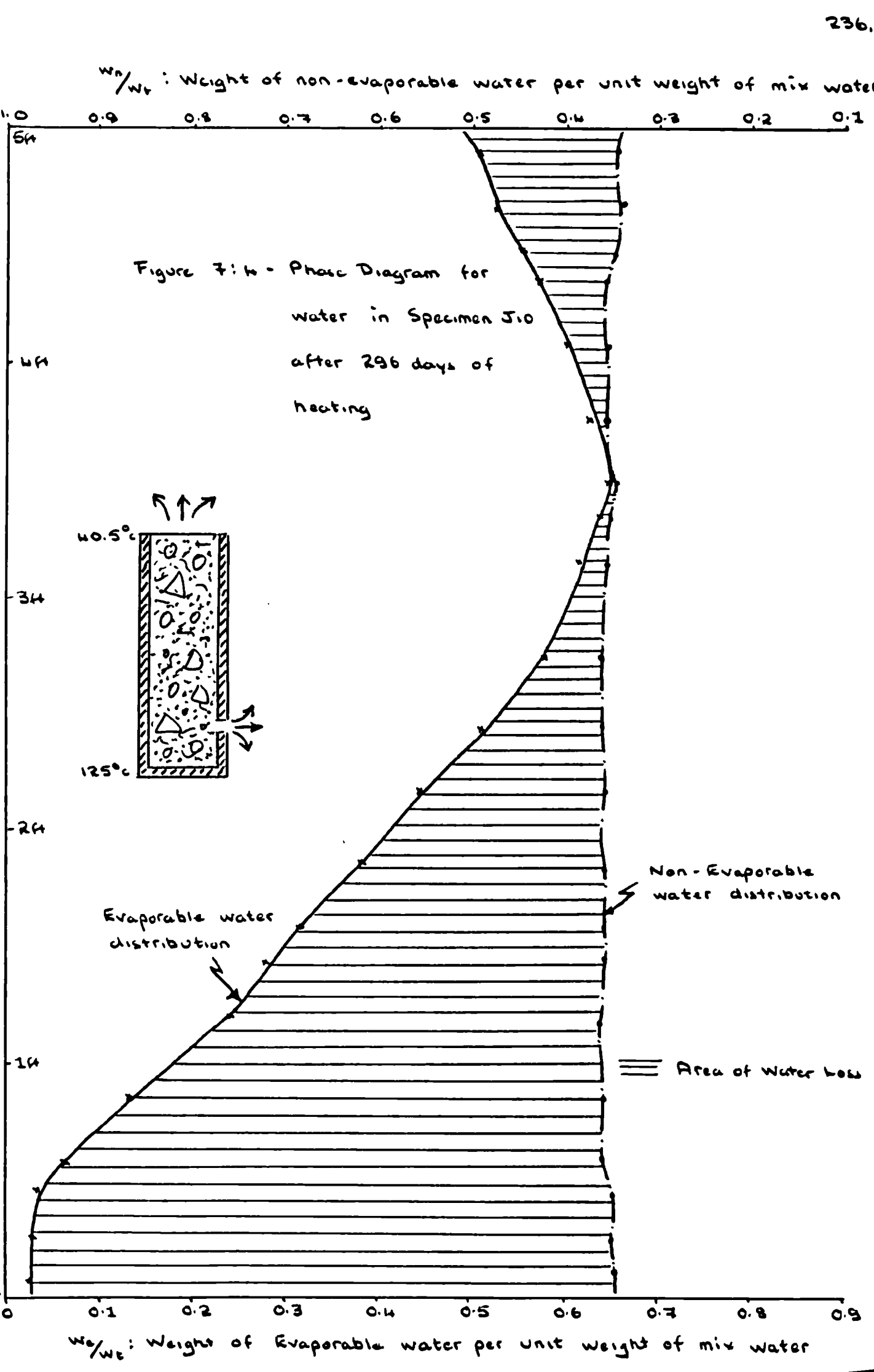


Fig 7·3 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen J10 against time of heating.


w_n/w_t : Weight of non-evaporable water per unit weight of mix water
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
5H
4H
3H
2H
1H
Figure 7:14 - Phase Diagram for water in Specimen J10 after 296 days of heating
40.5°c
125°c
Non-Evaporable water distribution
Evaporable water distribution
Area of Water Loss
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
w_e/w_t : Weight of Evaporable water per unit weight of mix water

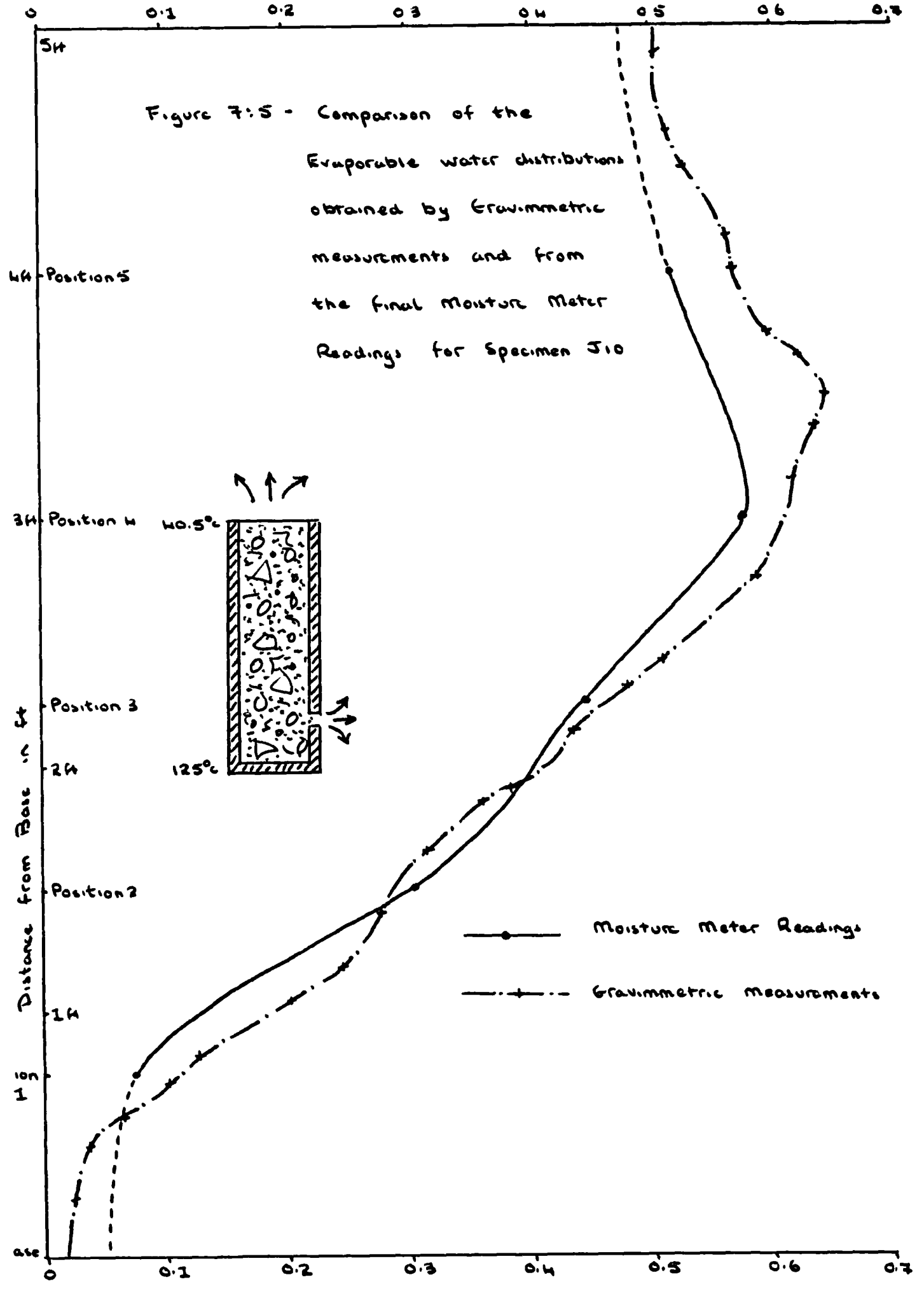


Figure 7:5 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurments and from the final Moisture Meter Readings for Specimen J10

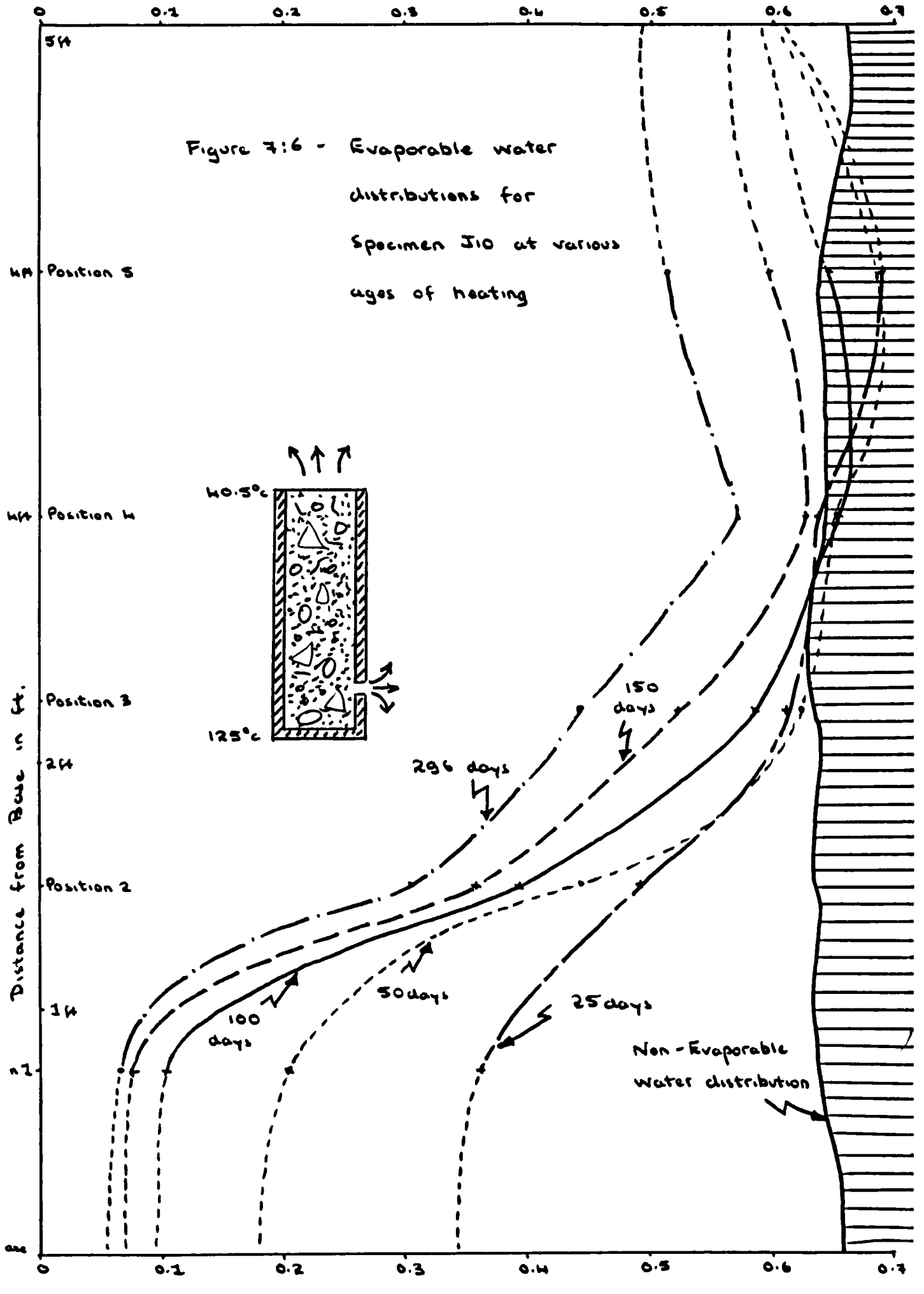


Figure 7:6 - Evaporable water distributions for Specimen J10 at various ages of heating

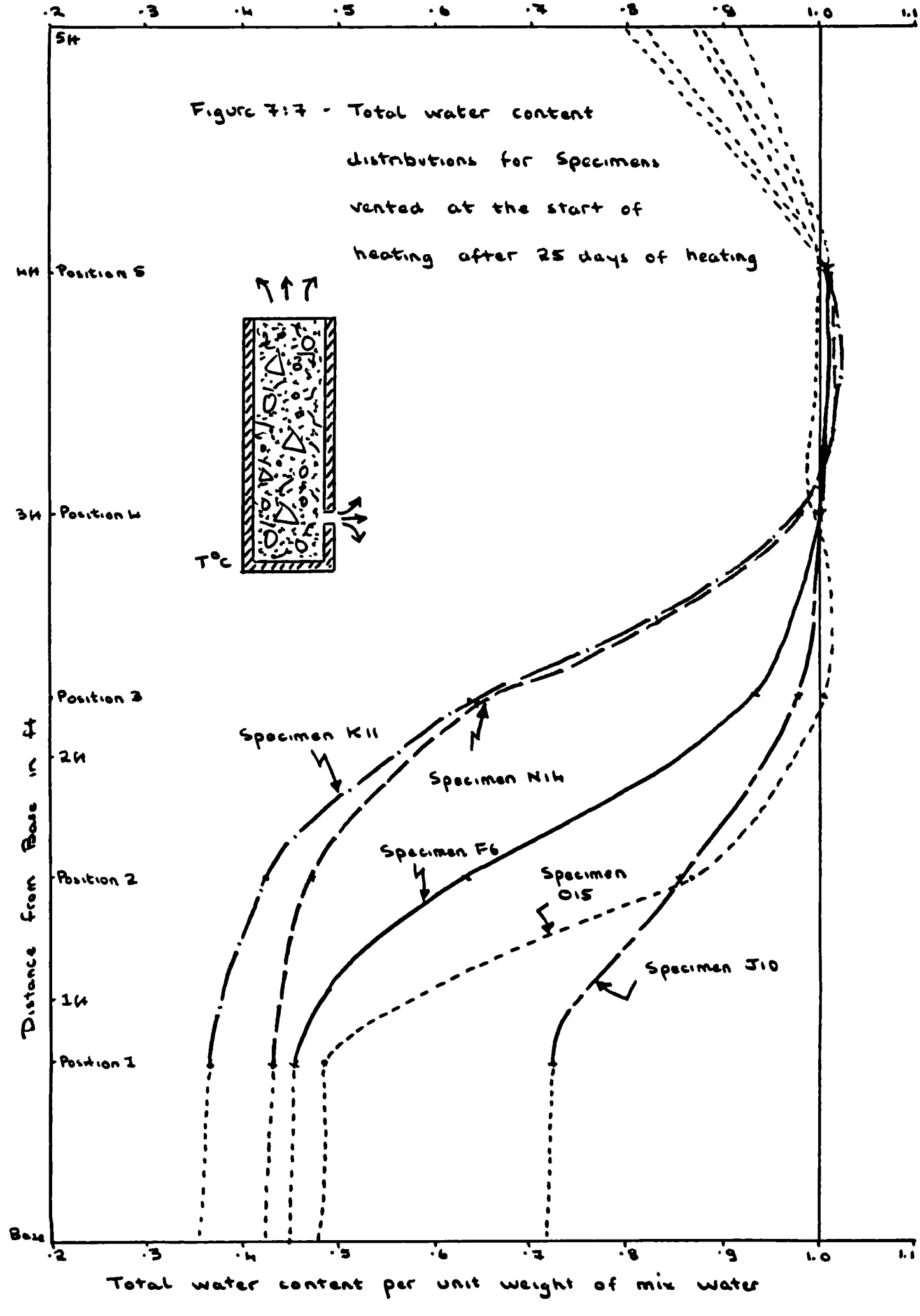


Figure 7:7 - Total water content distributions for Specimens vented at the start of heating after 25 days of heating

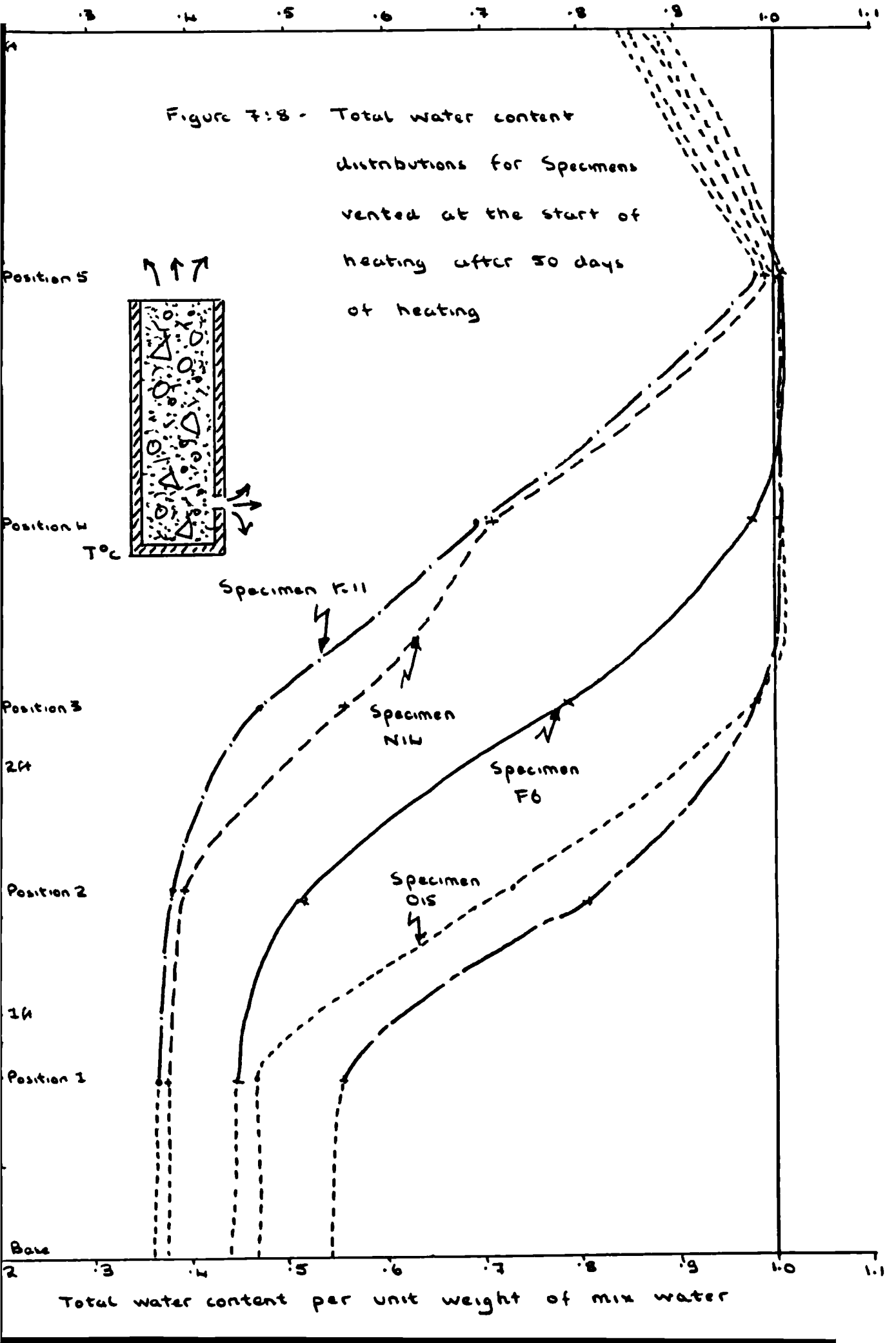


Figure 7:8 - Total water content distributions for Specimens vented at the start of heating after 30 days of heating

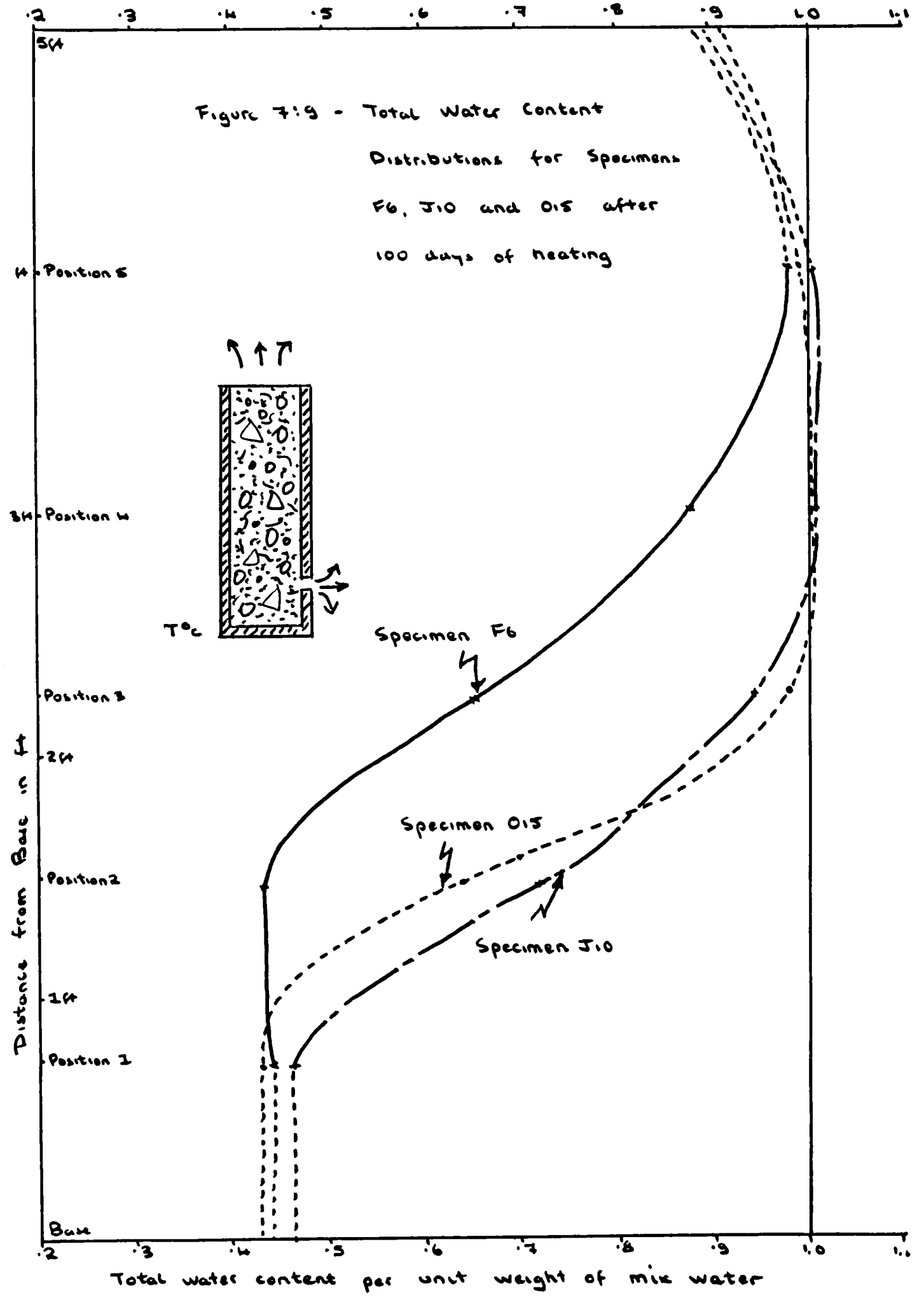


Figure 7:9 - Total Water Content Distributions for Specimens F6, J10 and 015 after 100 days of heating

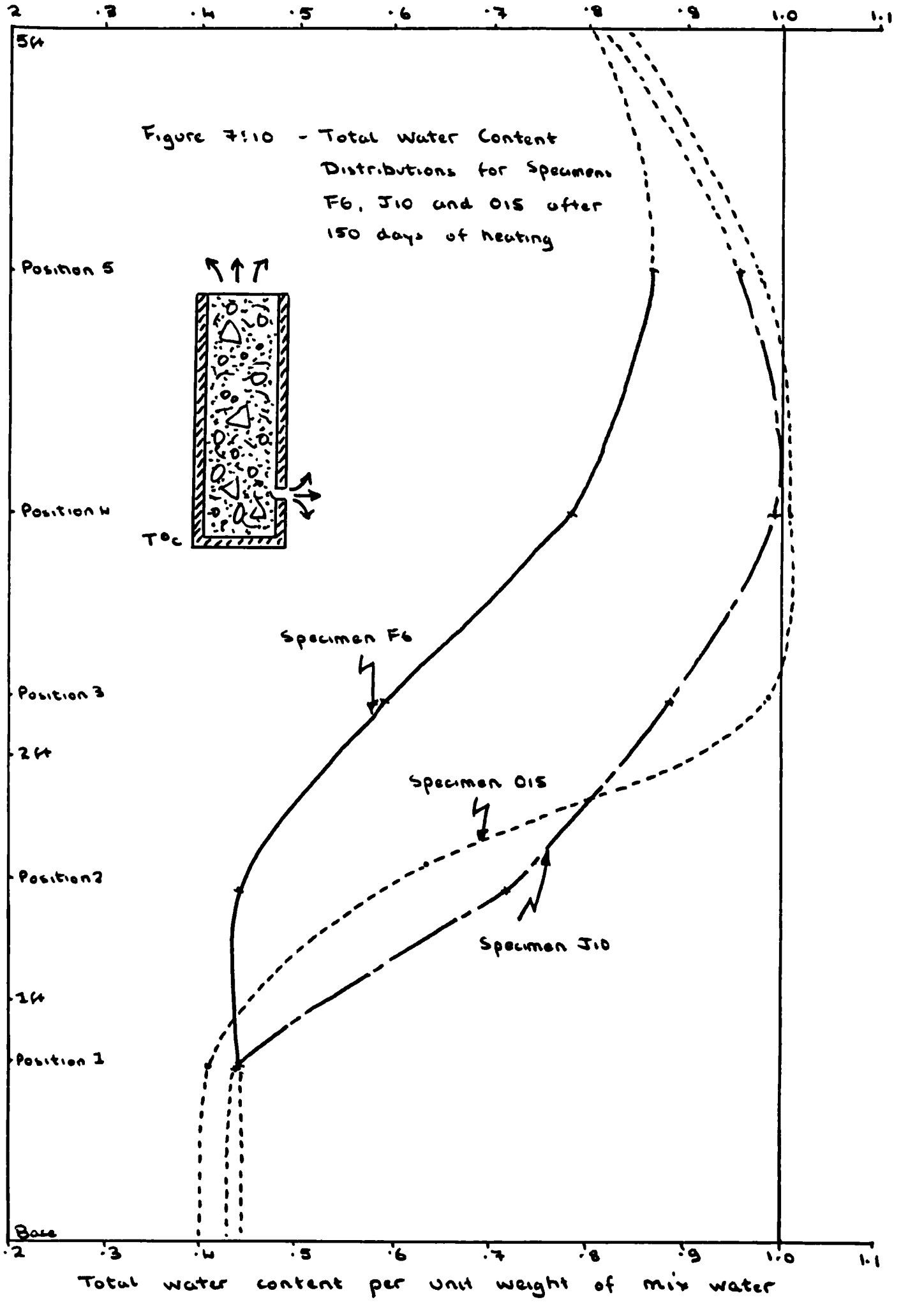


Figure 7:10 - Total Water Content Distributions for Specimens F6, J10 and 015 after 150 days of heating

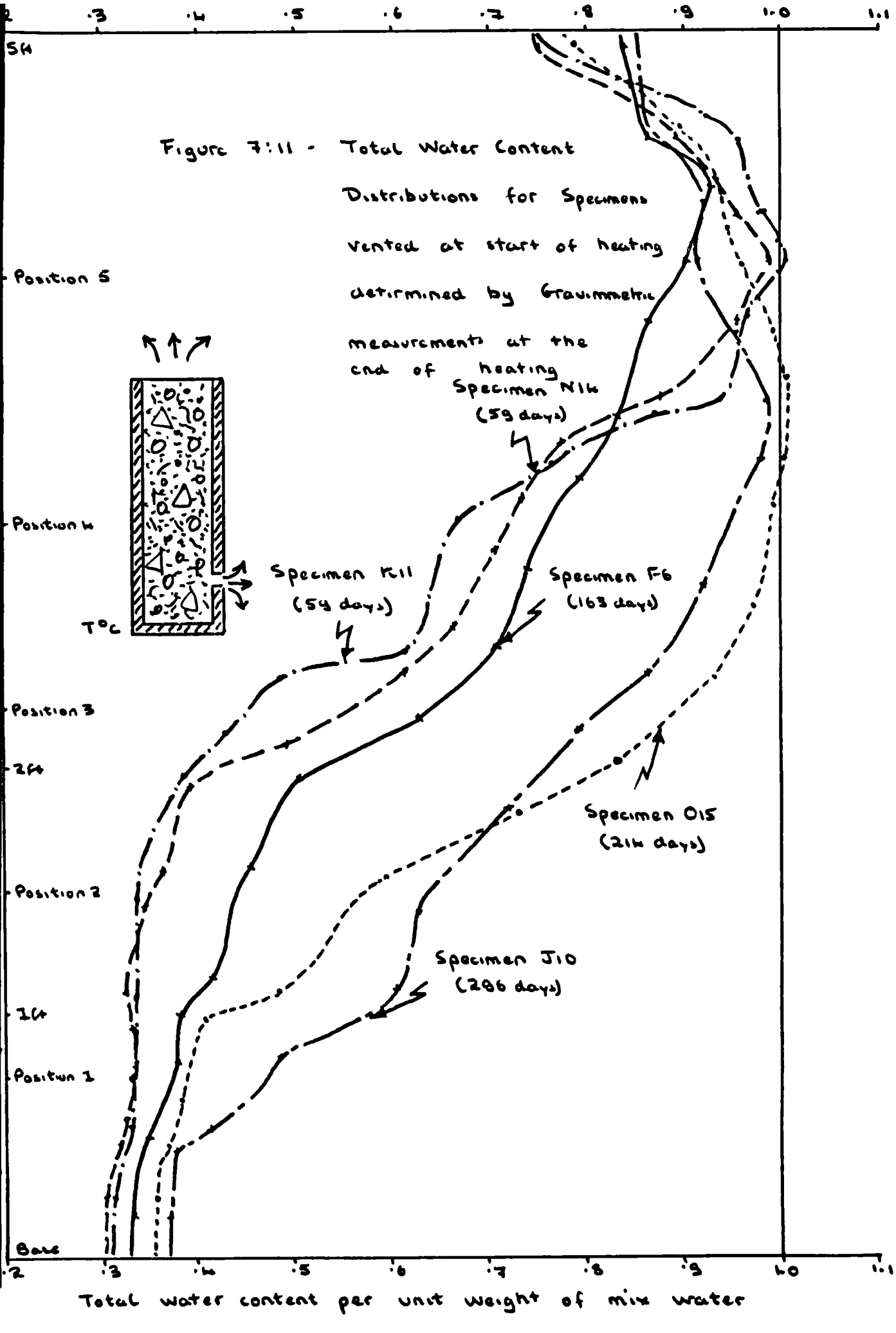


Figure 7:11 - Total Water Content Distributions for Specimens vented at start of heating determined by Gravimmetric measurements at the end of heating

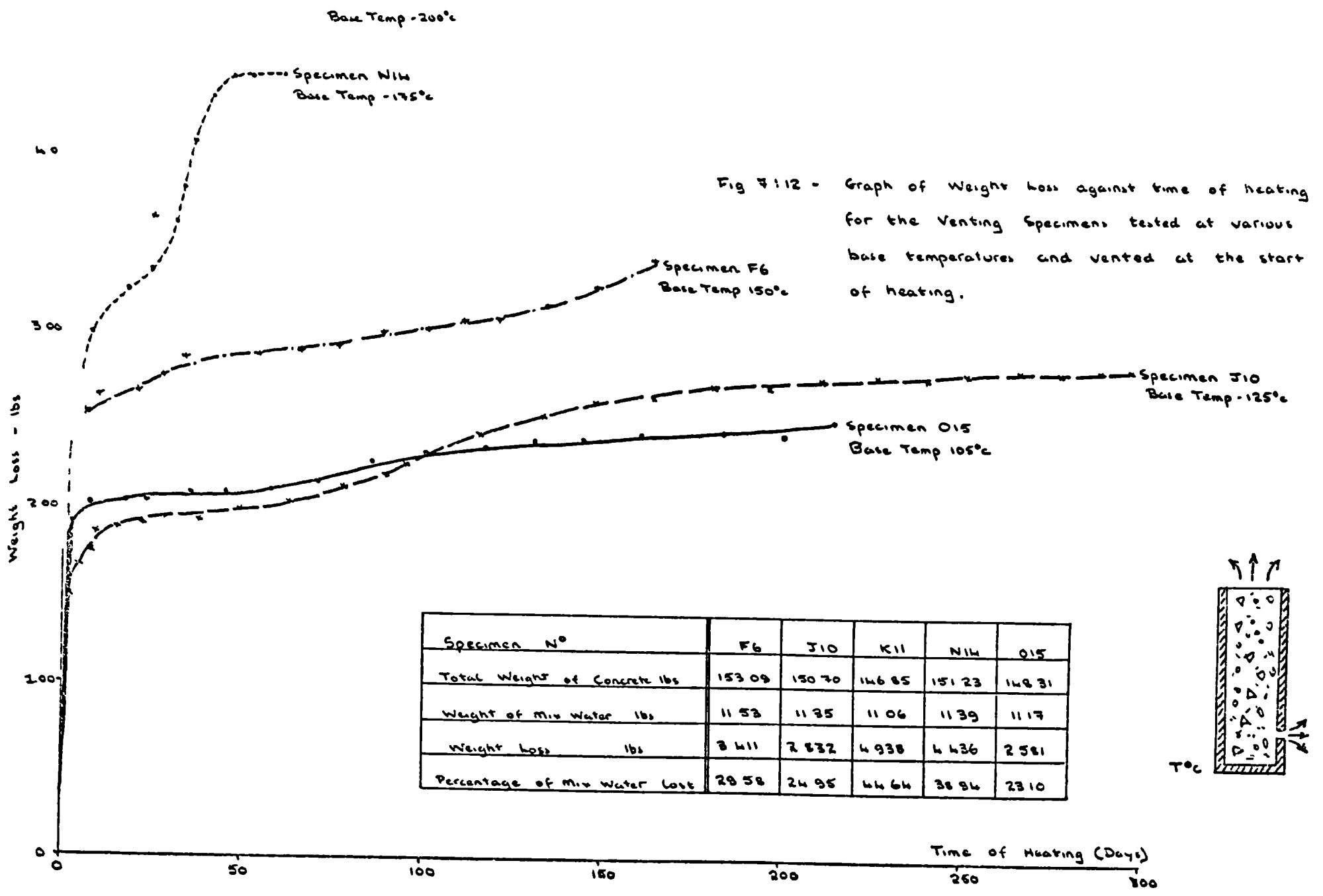
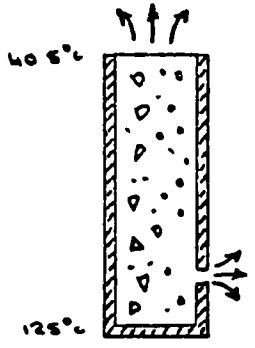


Fig 7:12 - Graph of Weight loss against time of heating for the Venting Specimens tested at various base temperatures and vented at the start of heating.

Specimen N°	F6	J10	K11	N14	015
Total Weight of Concrete lbs	153 09	150 70	146 85	151 23	148 31
Weight of mix water lbs	11 53	11 35	11 06	11 39	11 17
Weight loss lbs	3 411	2 832	4 938	4 436	2 581
Percentage of mix water lost	29 58	24 95	44 64	38 94	23 10

Fig 7·13 - Gauge Pore Pressures at the various instrumentation positions in Specimen J10 against time of heating



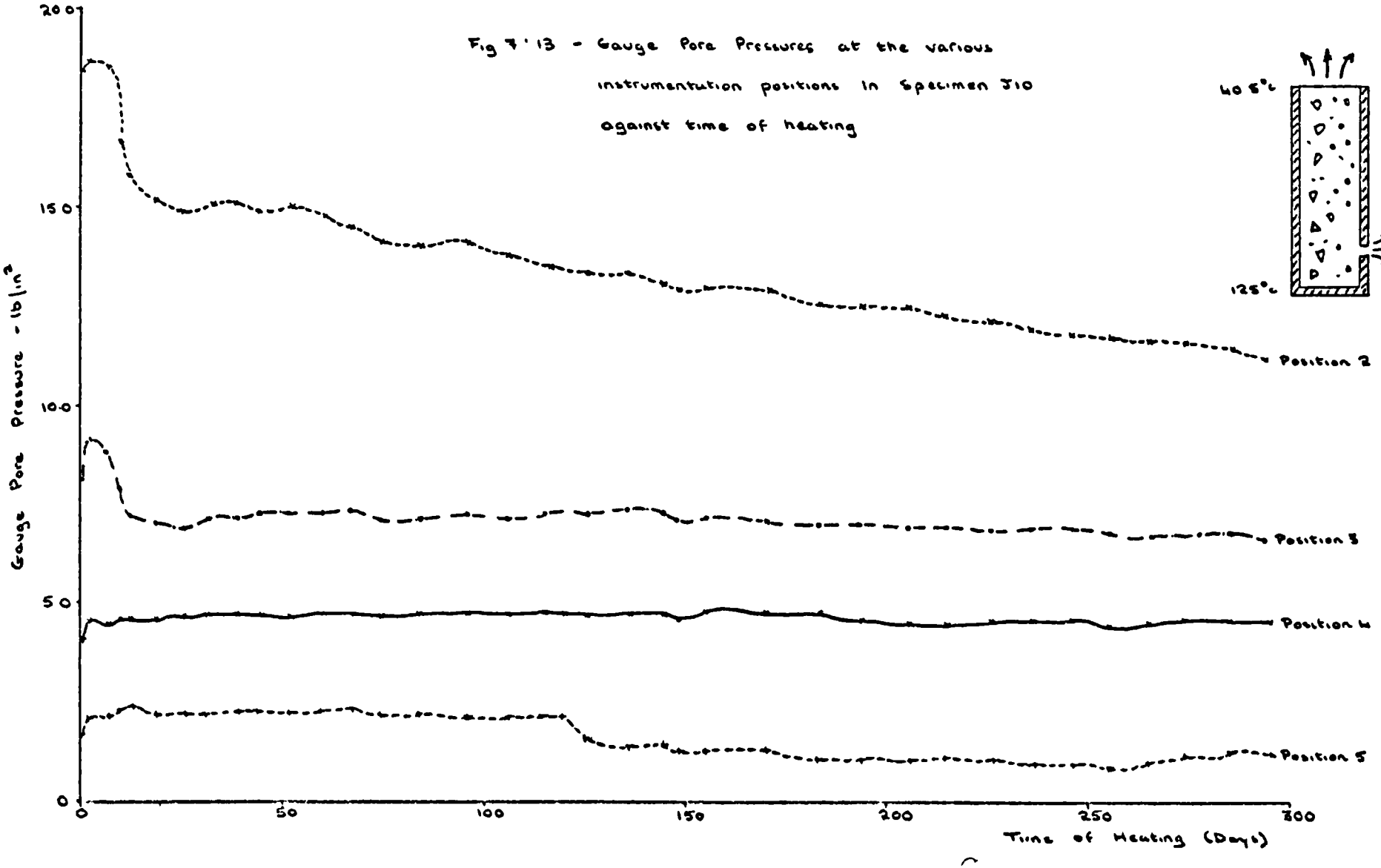
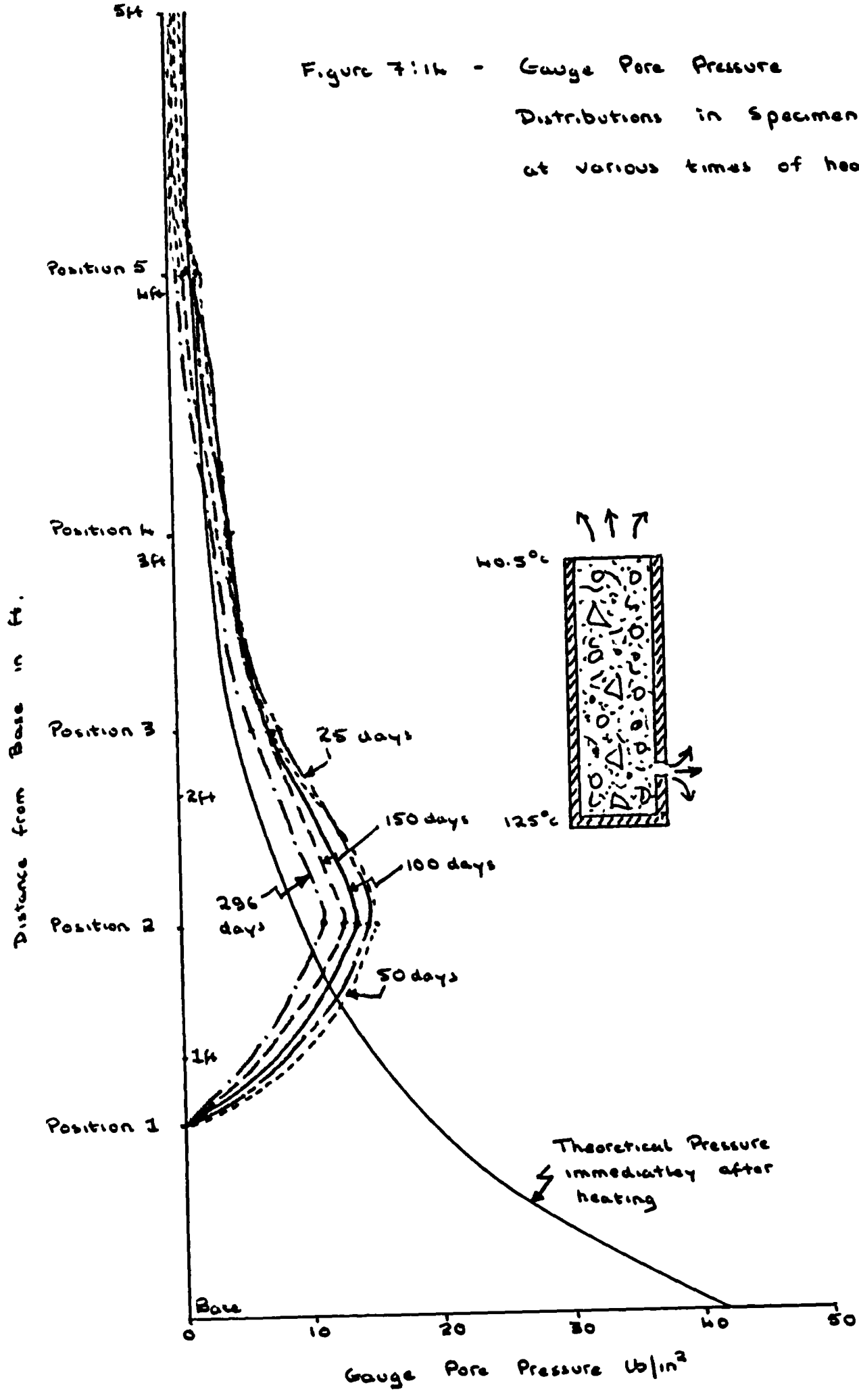


Figure 7:14 - Gauge Pore Pressure Distributions in Specimen J10 at various times of heating.



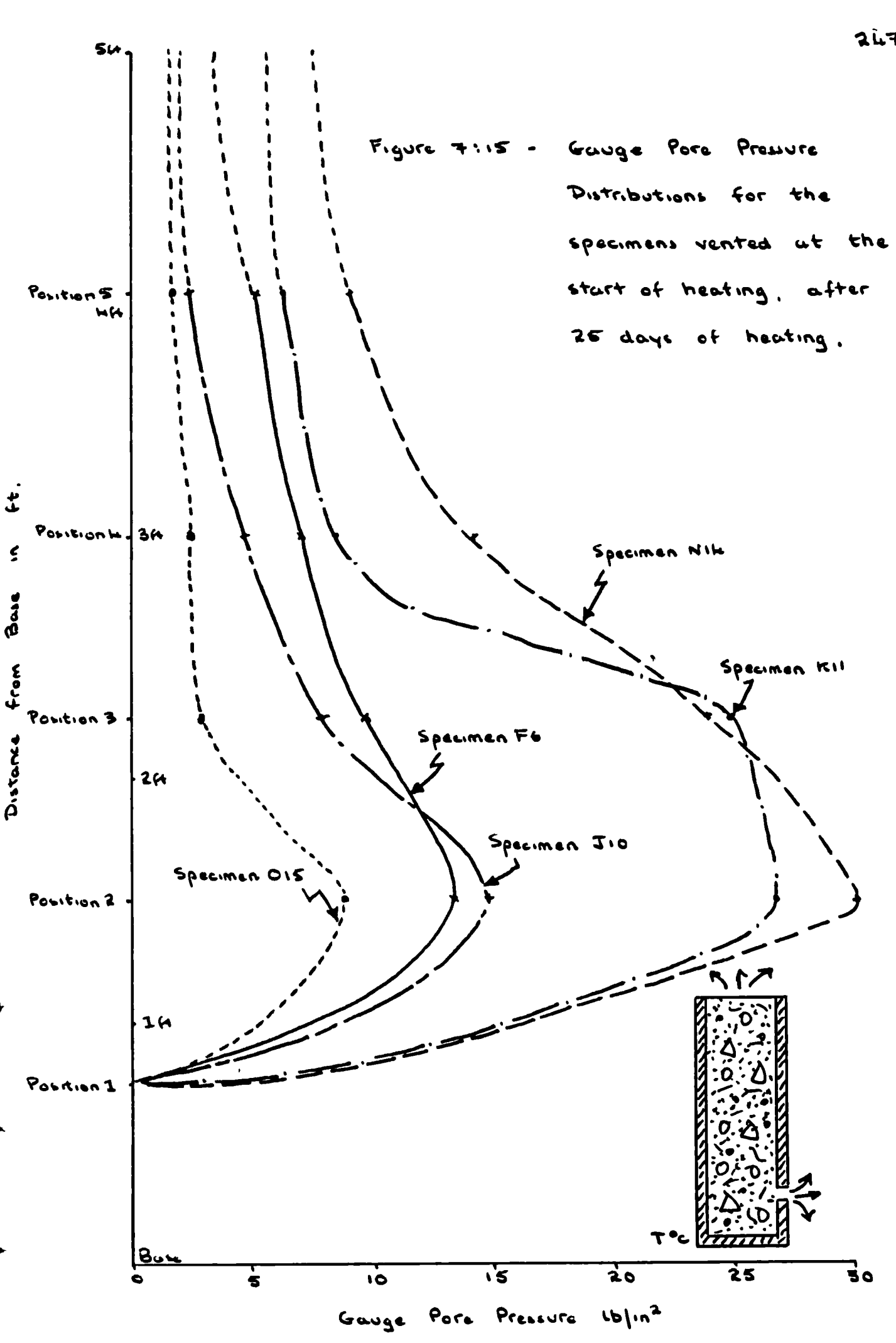


Figure 7:15 - Gauge Pore Pressure Distributions for the specimens vented at the start of heating, after 25 days of heating.

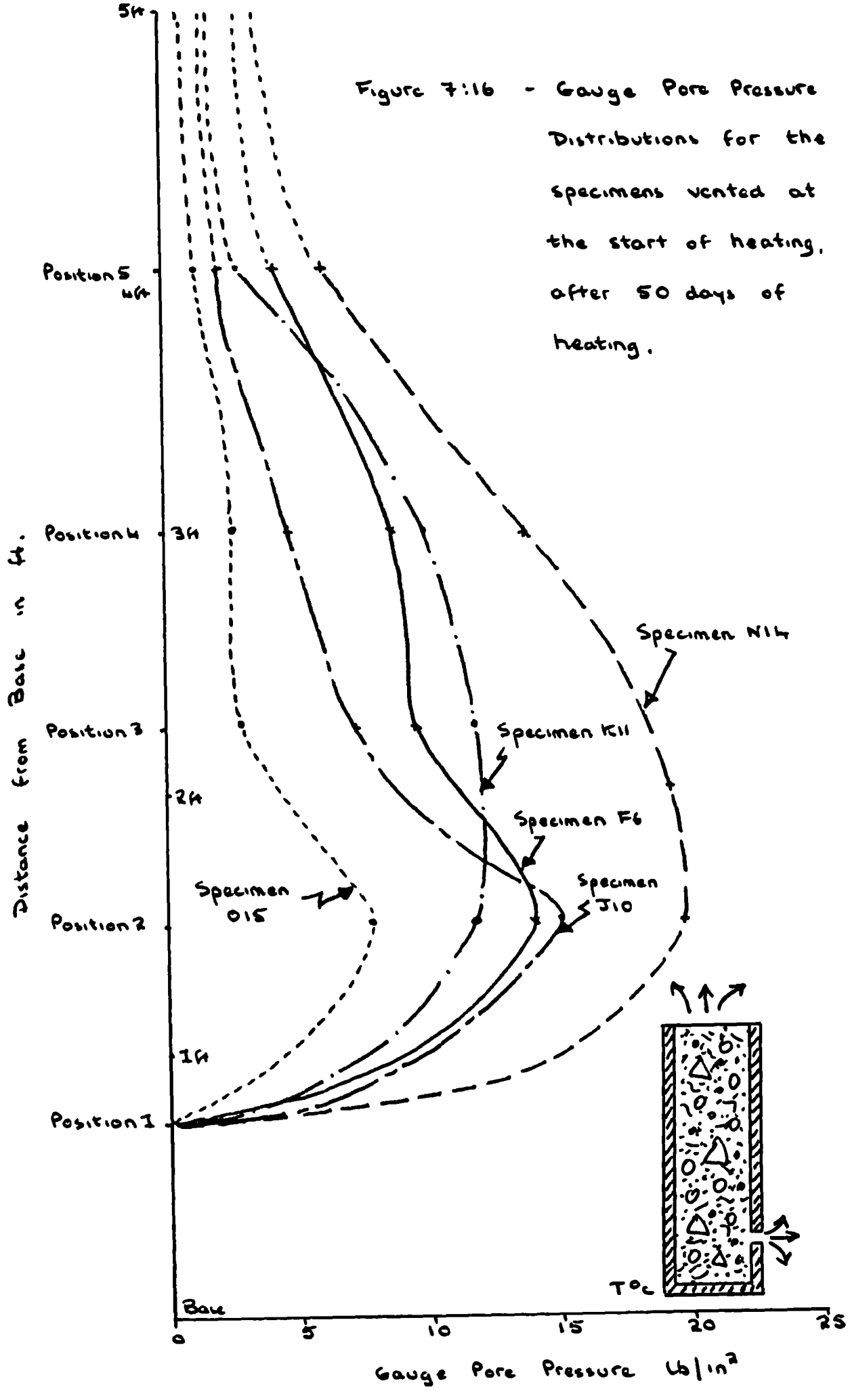


Figure 7:16 - Gauge Pore Pressure Distributions for the specimens vented at the start of heating, after 50 days of heating.

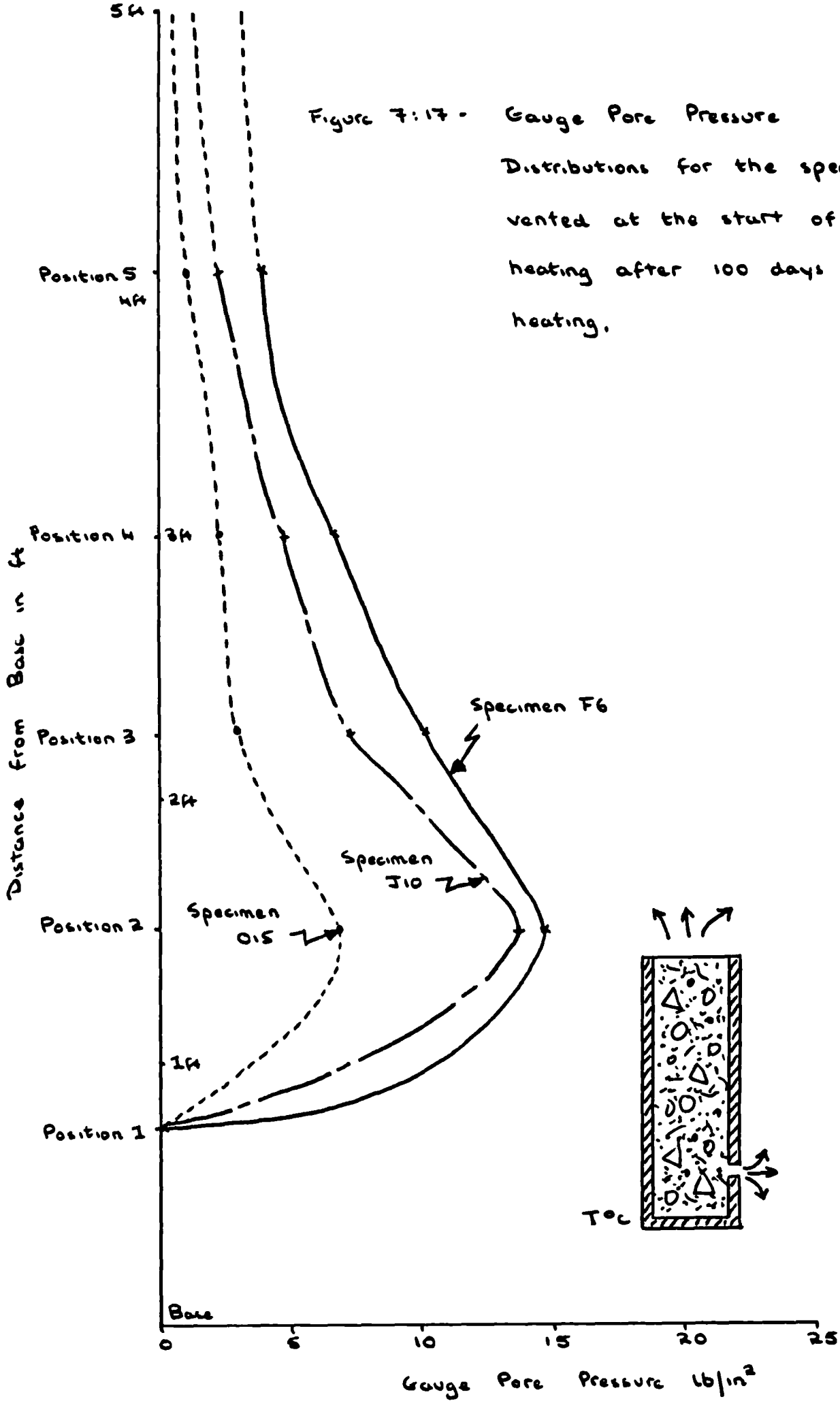


Figure 7:17 - Gauge Pore Pressure Distributions for the specimens vented at the start of heating after 100 days of heating.

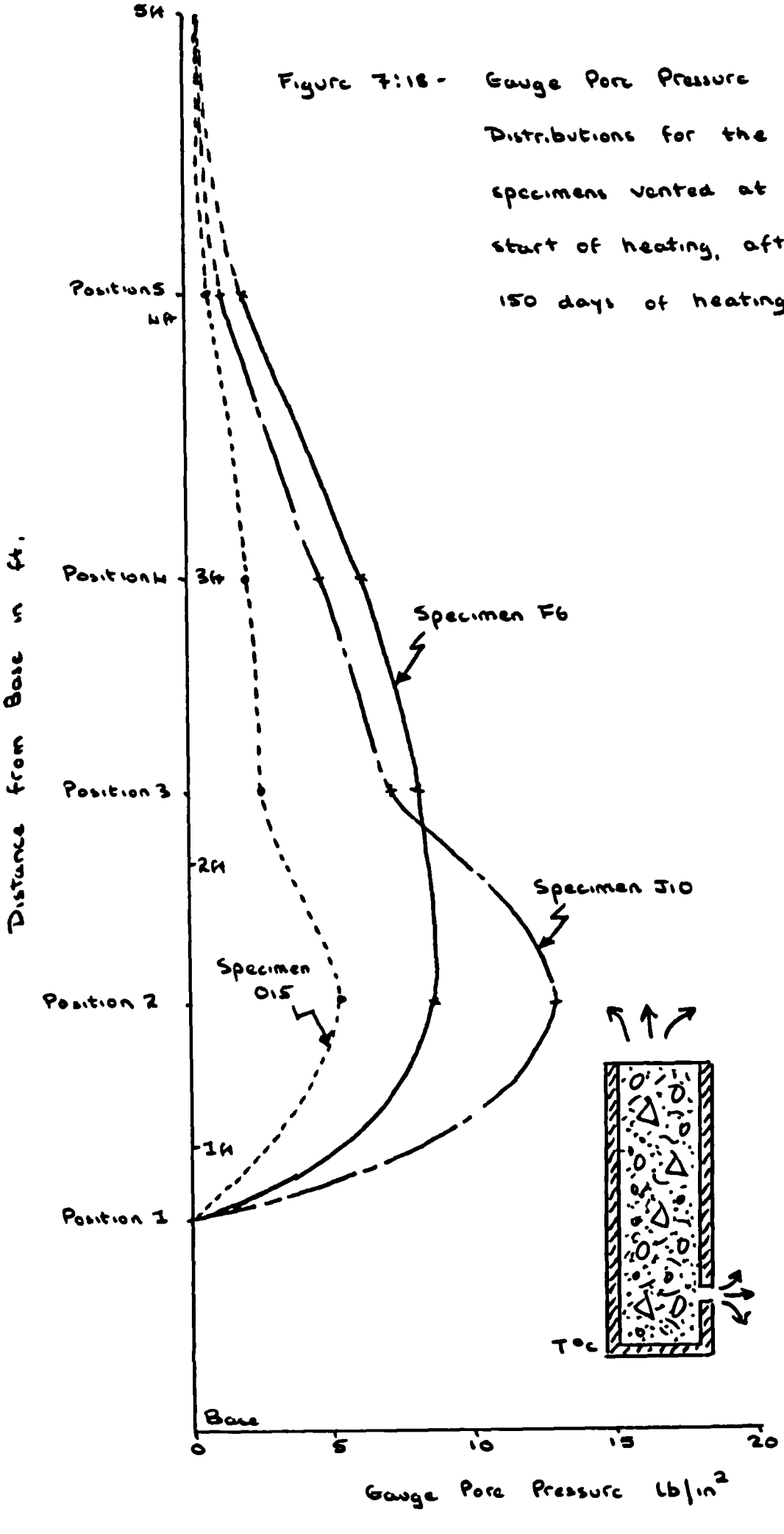


Figure 7:18 - Gauge Pore Pressure Distributions for the specimens vented at the start of heating, after 150 days of heating

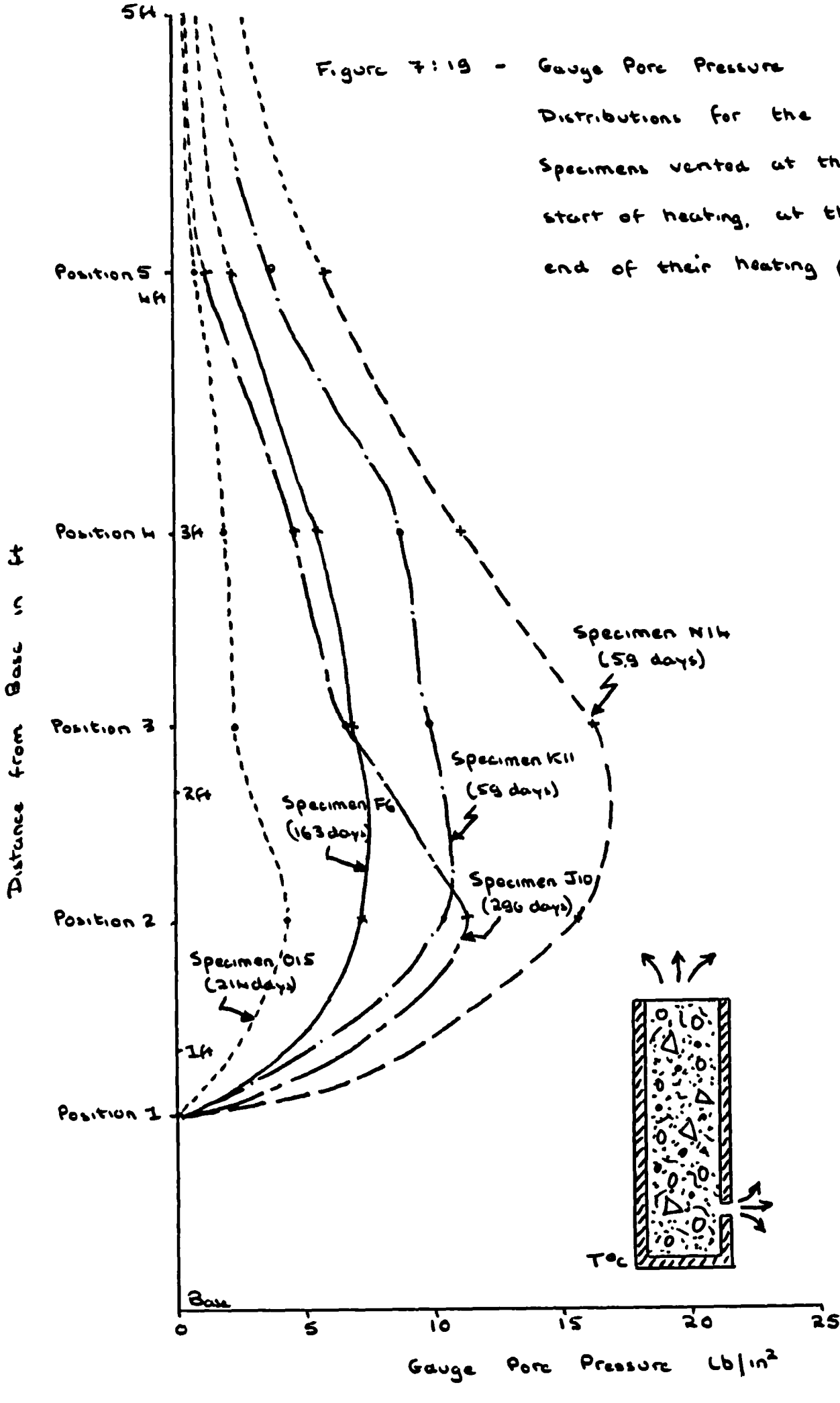


Figure 7:19 - Gauge Pore Pressure Distributions for the Specimens vented at the start of heating, at the end of their heating period.

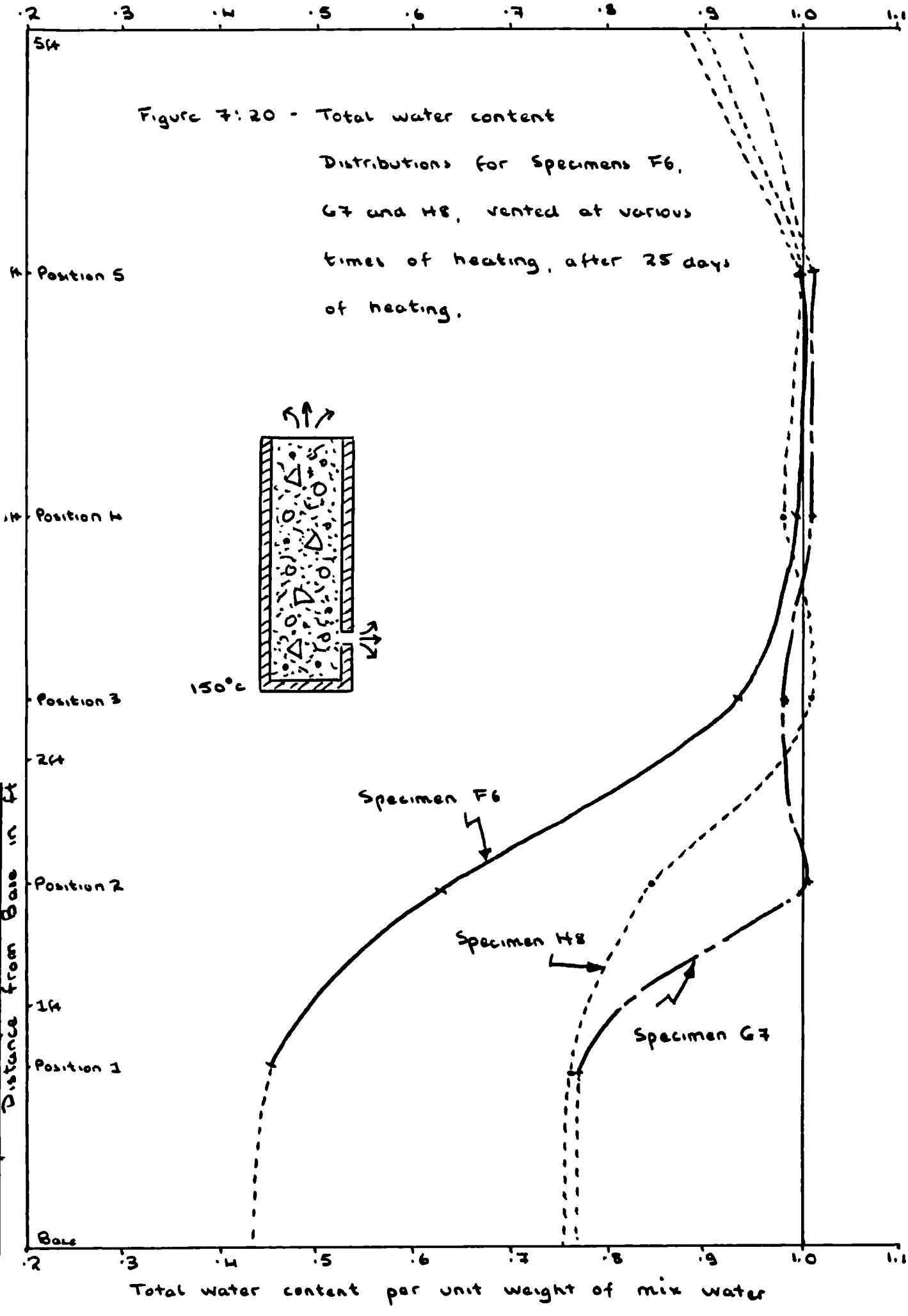


Figure 7:20 - Total water content Distributions for Specimens F6, G7 and H8, vented at various times of heating, after 25 days of heating.

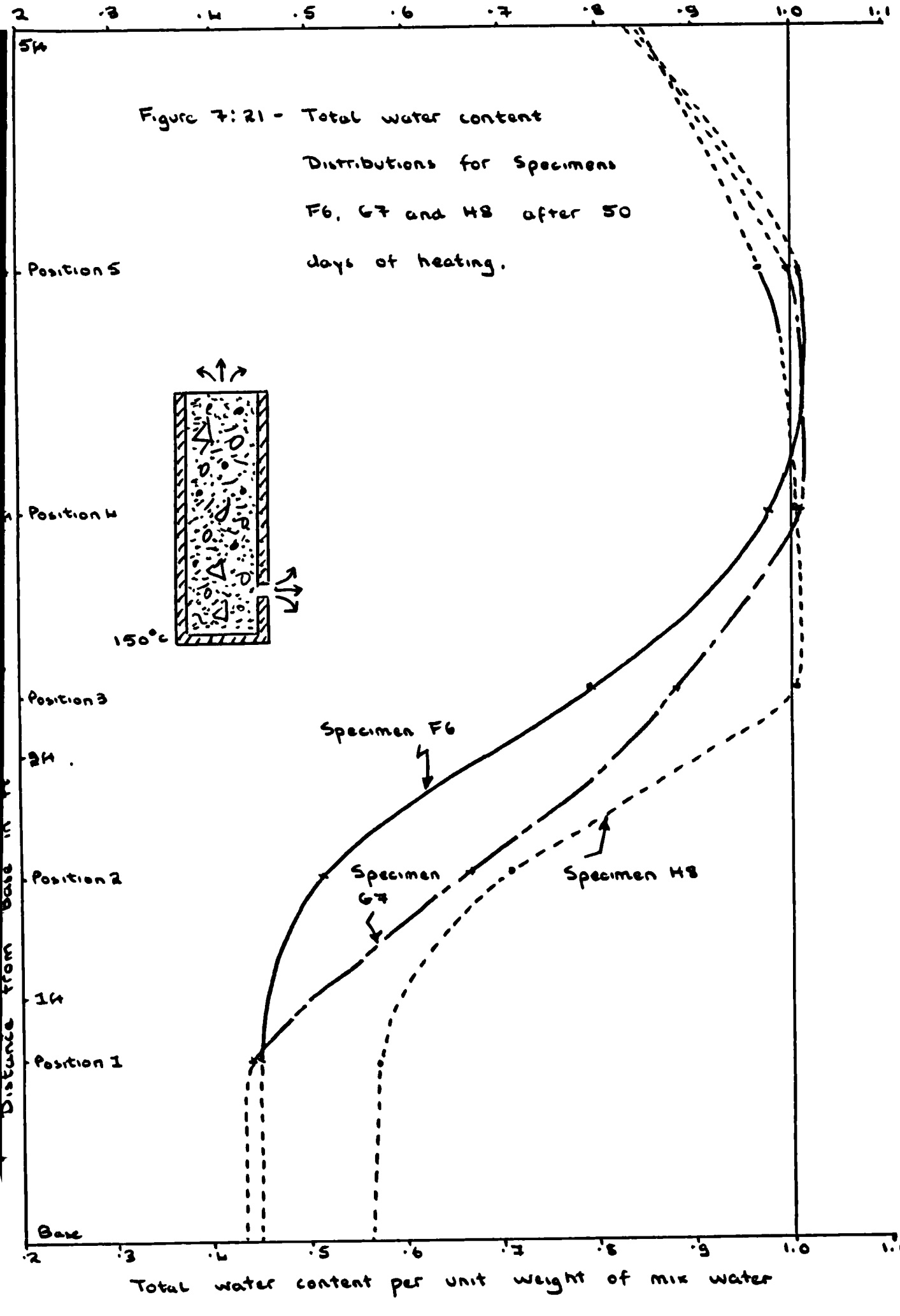


Figure 7:21 - Total water content Distributions for Specimens F6, G7 and H8 after 50 days of heating.

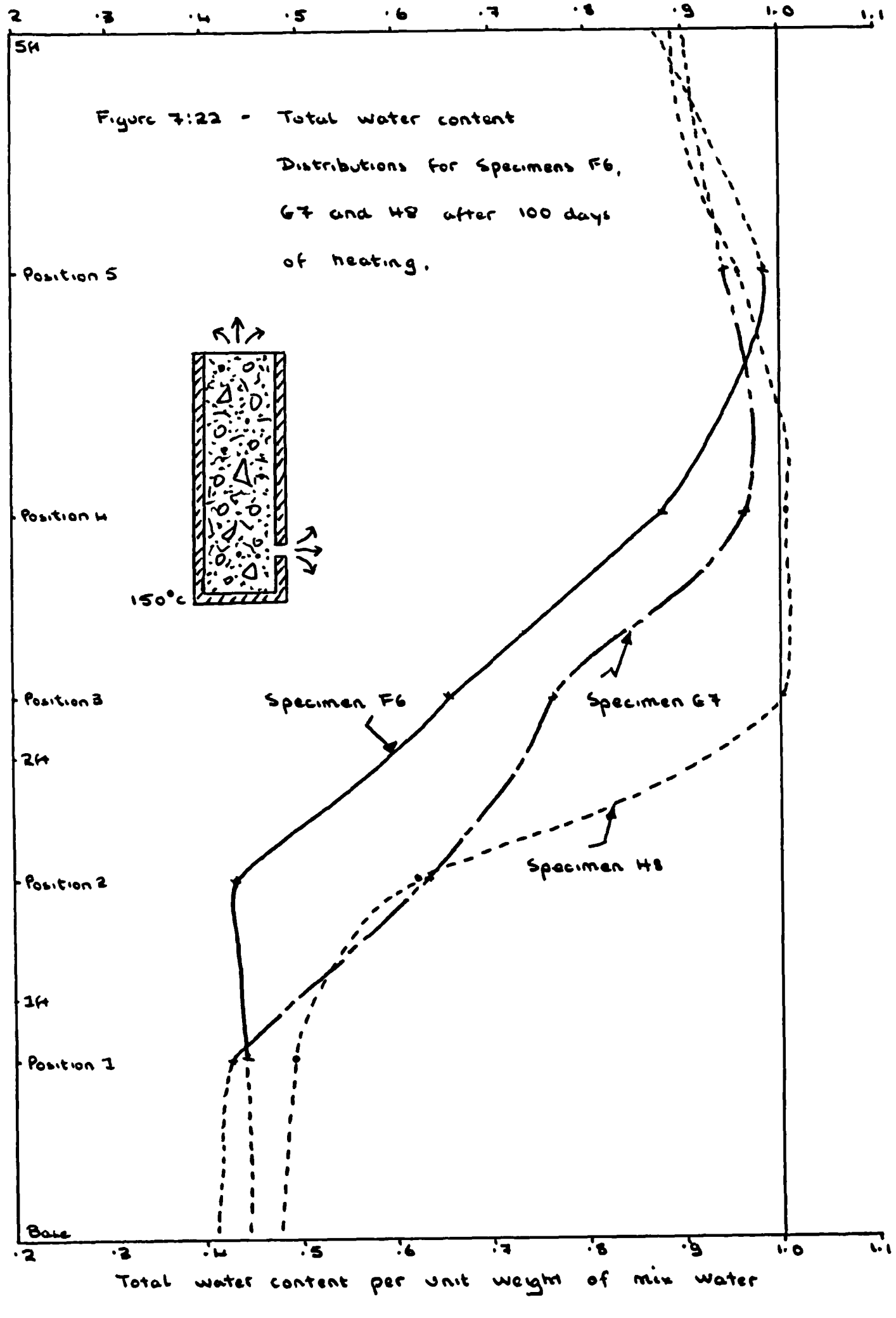


Figure 7:22 - Total water content Distributions for Specimens F6, G7 and H8 after 100 days of heating.

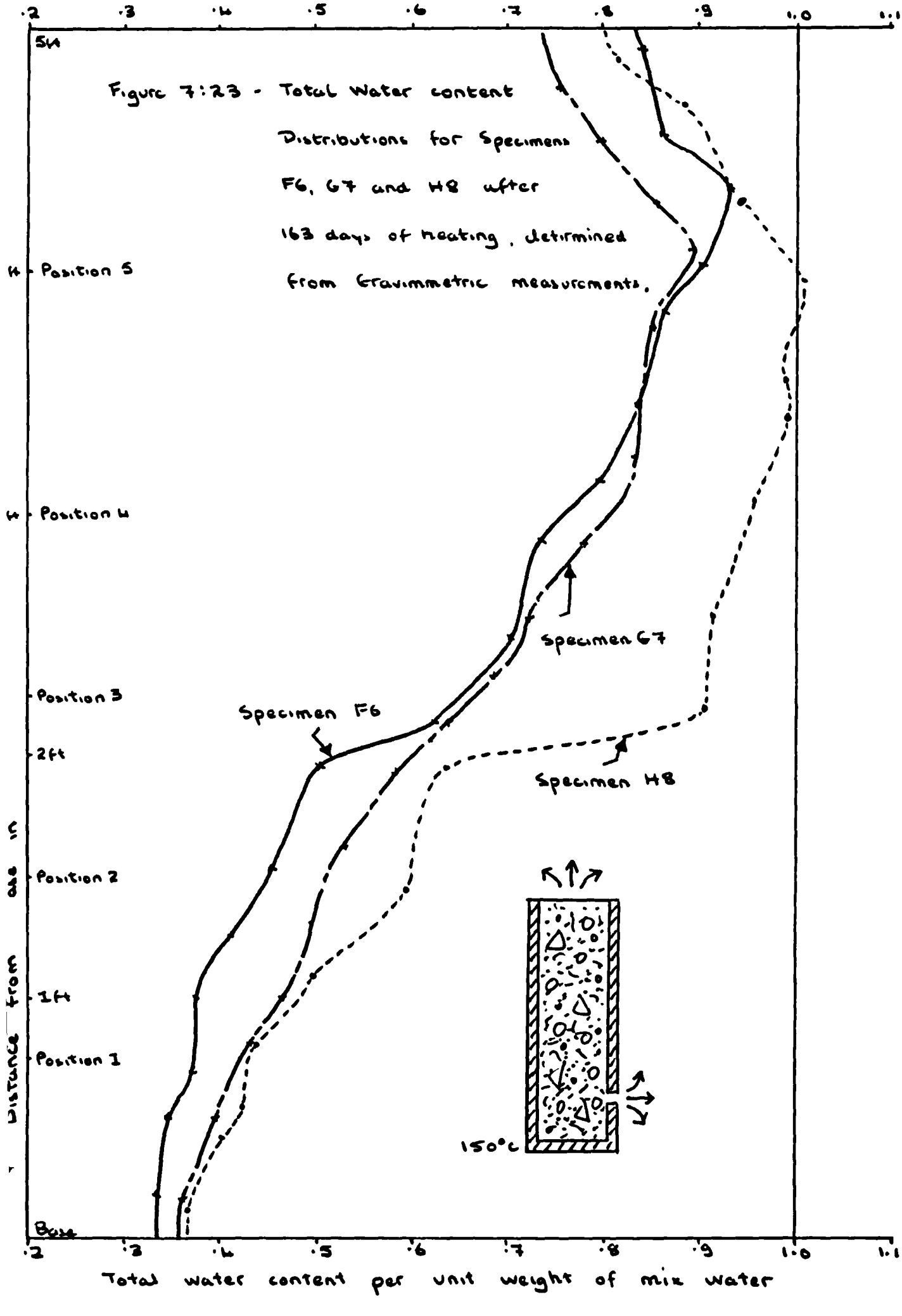


Figure 7:23 - Total Water content Distributions for Specimens F6, 67 and H8 after 163 days of heating, determined from Gravimmetric measurements.

Specimen N°	F6	G4	H6
Total Weight of Concrete lbs	153 09	148 84	151 63
Weight of Mix Water lbs	11 530	11 210	11 420
Weight loss lbs	3 411	3 173	2225
Percentage of Mix water lost	29 58	28 30	19 48

Fig 8·24 - Graph of Weight Loss against time of heating for the Venting Specimens tested at the same base temperature and vented at different times of heating

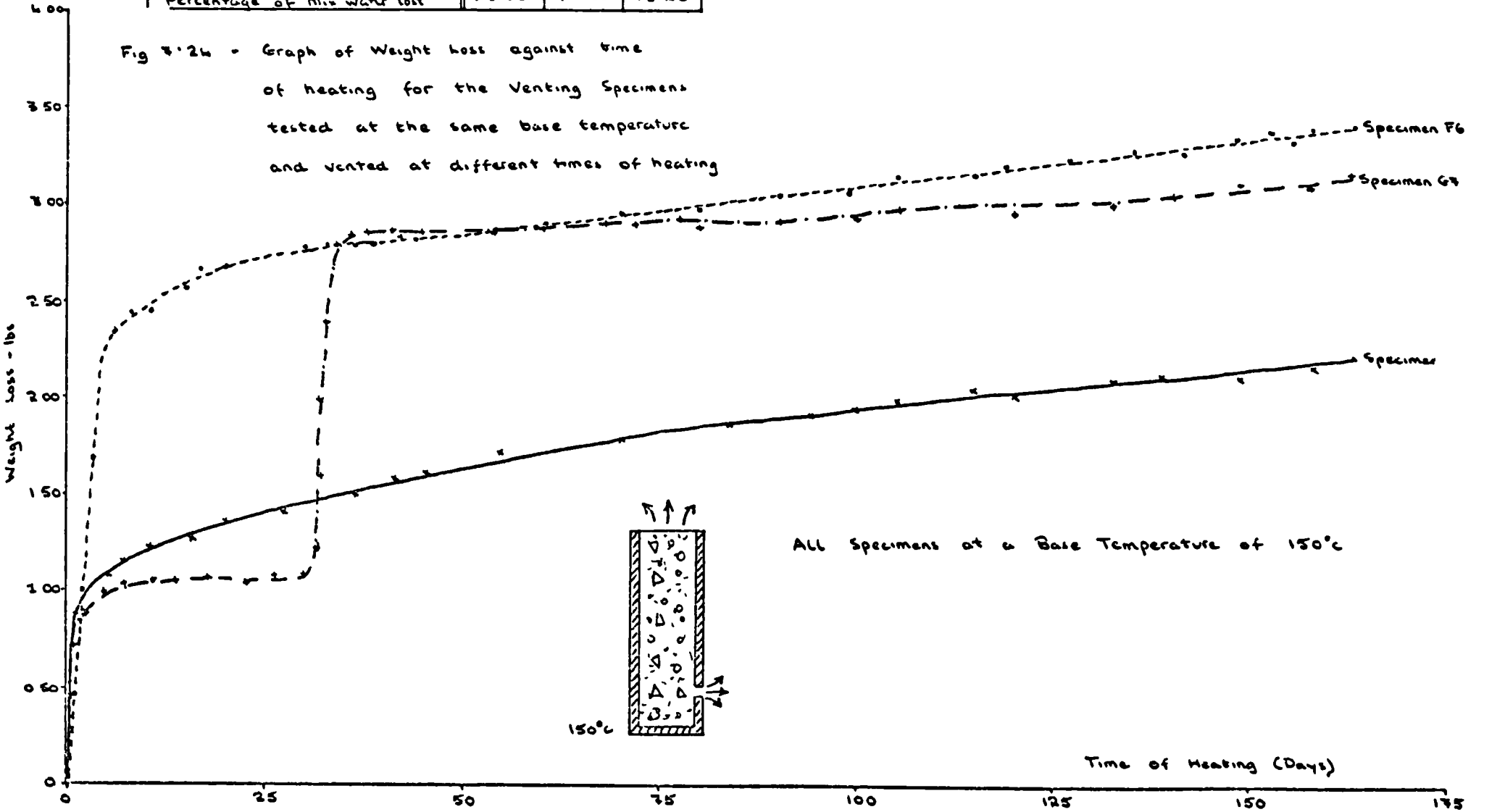


Figure 7:25 - Gauge Pore Pressure Distributions for Specimens F6, G7 and H8, vented at various times of heating, after 25 days of heating.

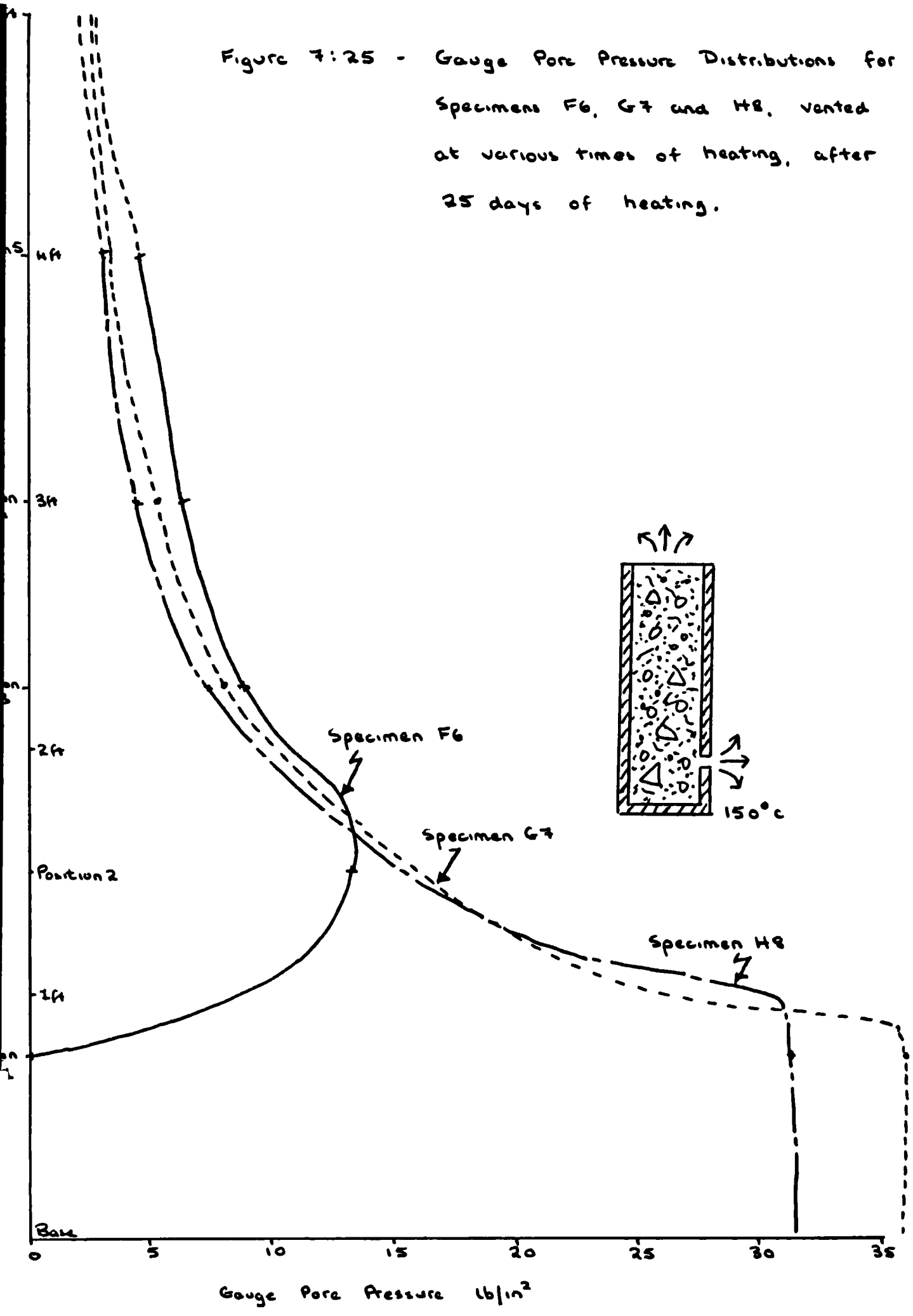
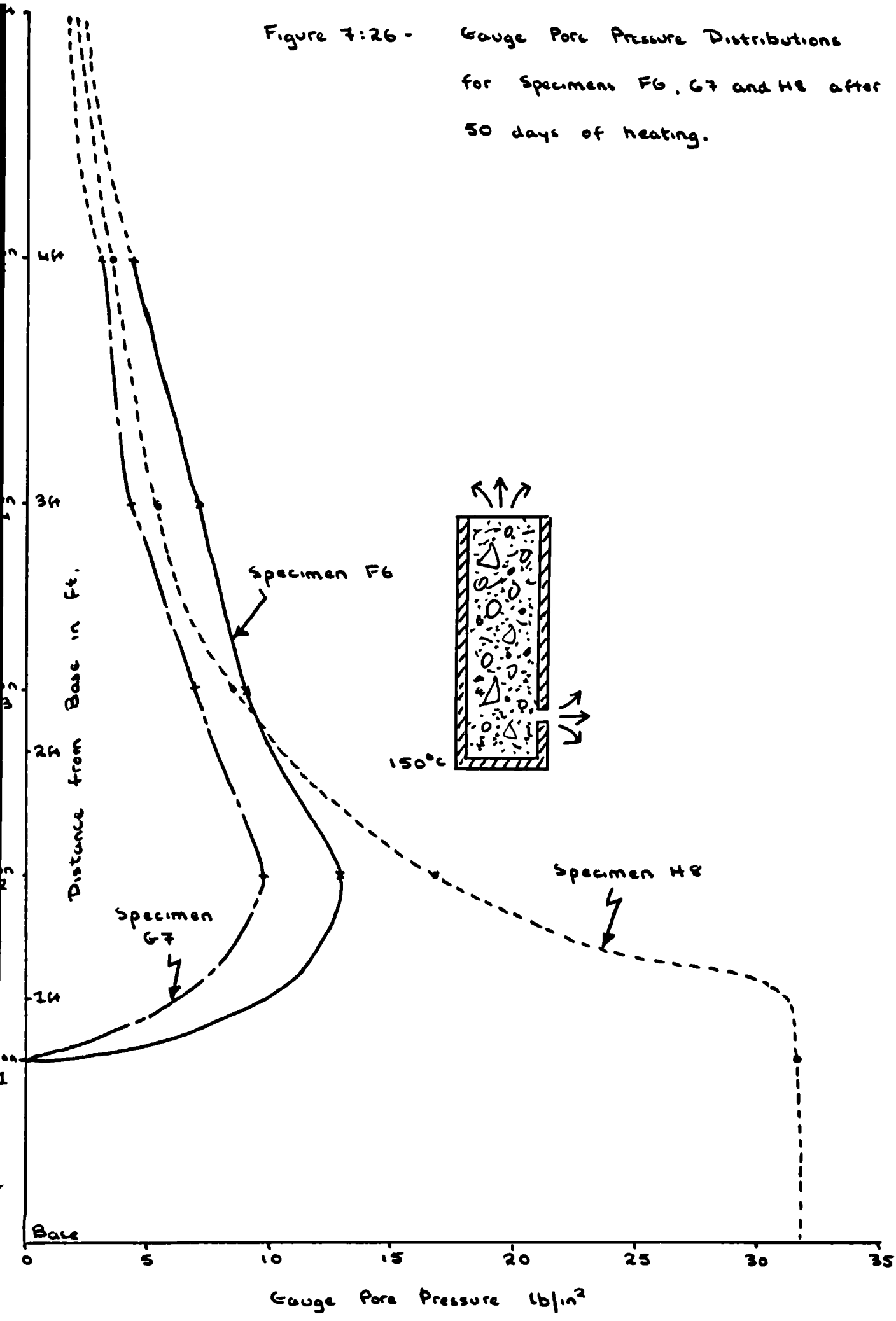


Figure 7:26 - Gauge Pore Pressure Distributions for Specimens F6, G7 and H8 after 50 days of heating.



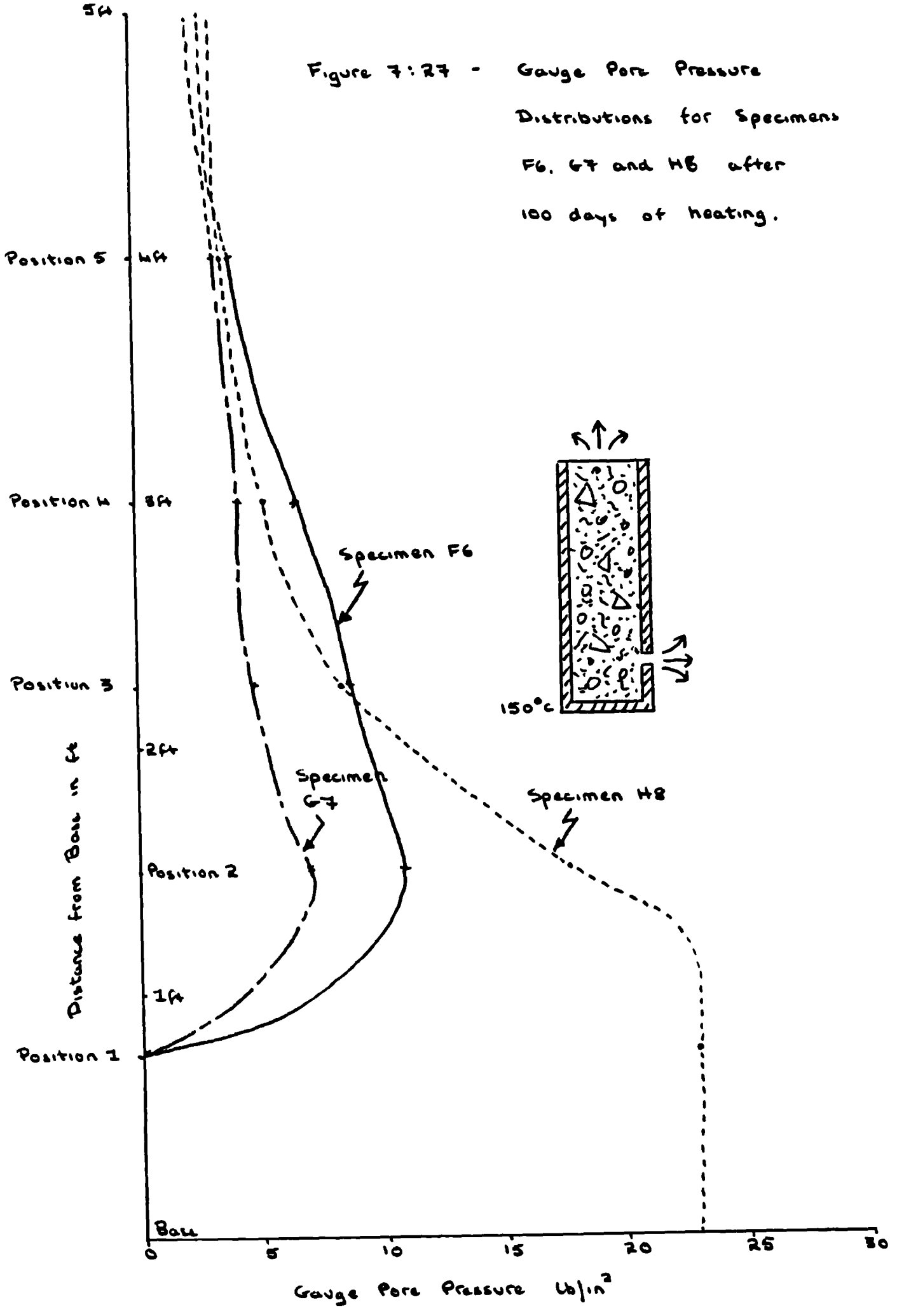


Figure 7:27 - Gauge Pore Pressure Distributions for Specimens F6, G7 and H8 after 100 days of heating.

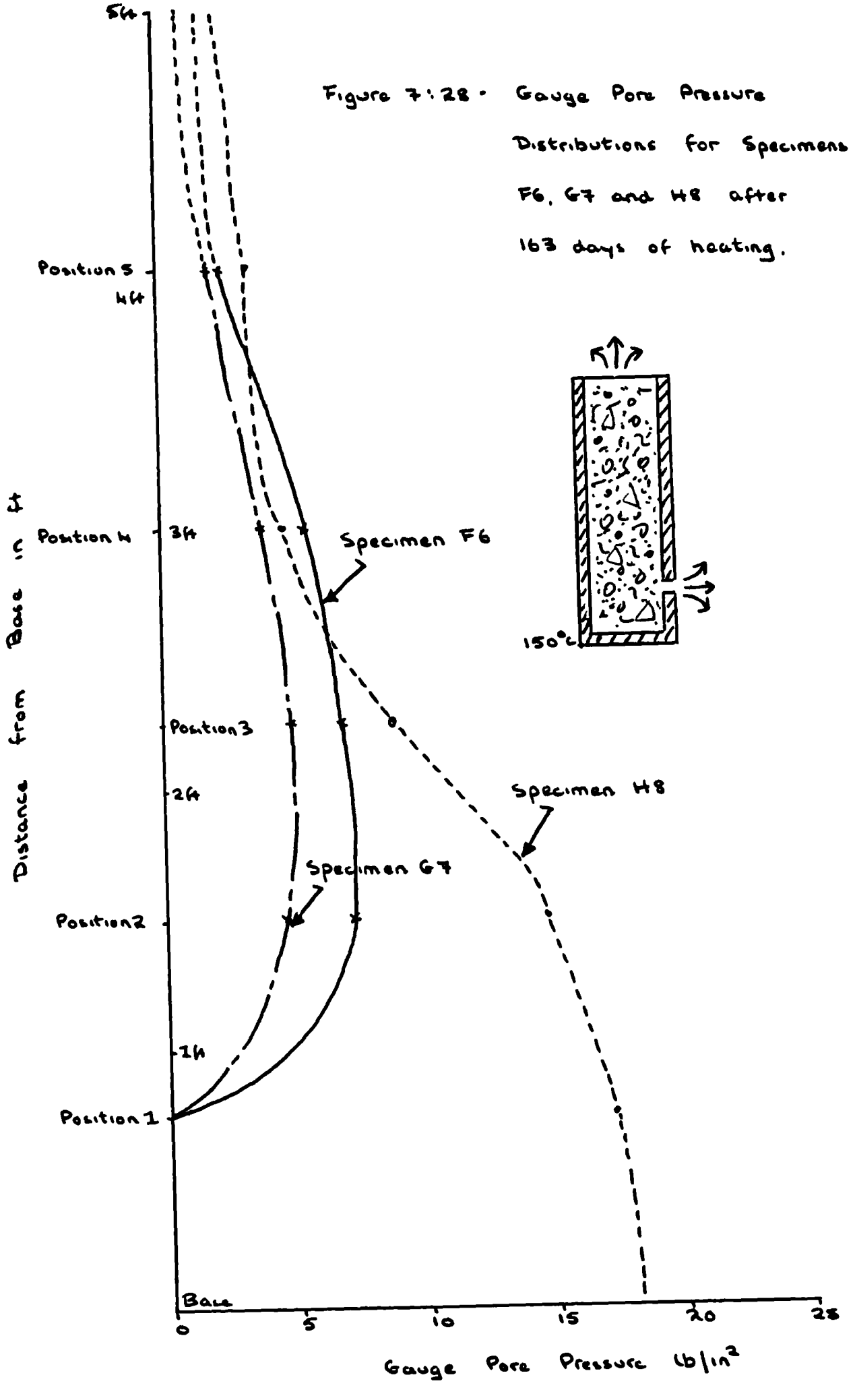
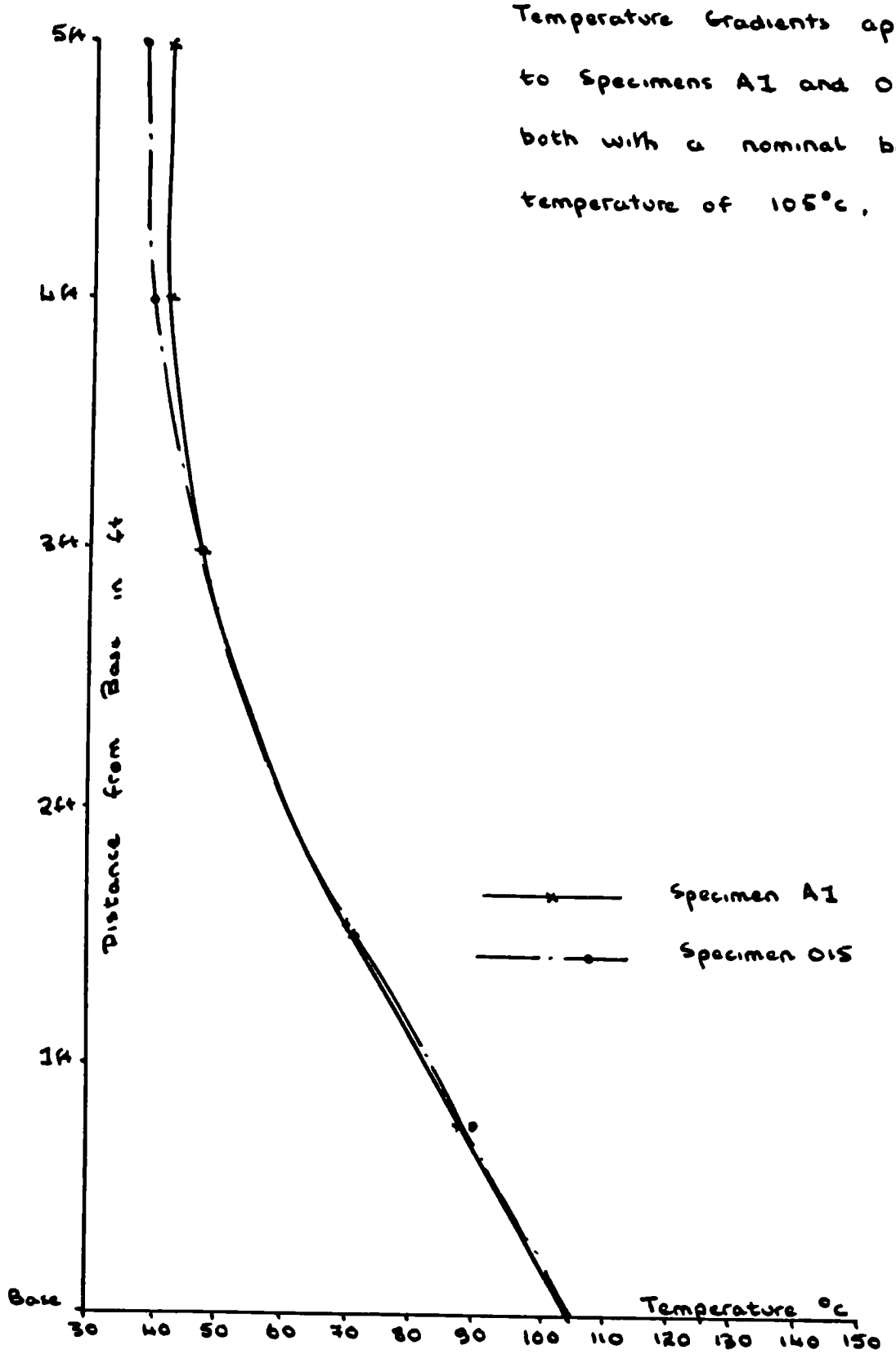


Figure 7:28. Gauge Pore Pressure Distributions for Specimens F6, G7 and H8 after 163 days of heating.

Figure 7:29 - Comparison of the Temperature Gradients applied to Specimens A1 and 015, both with a nominal base temperature of 105°c.



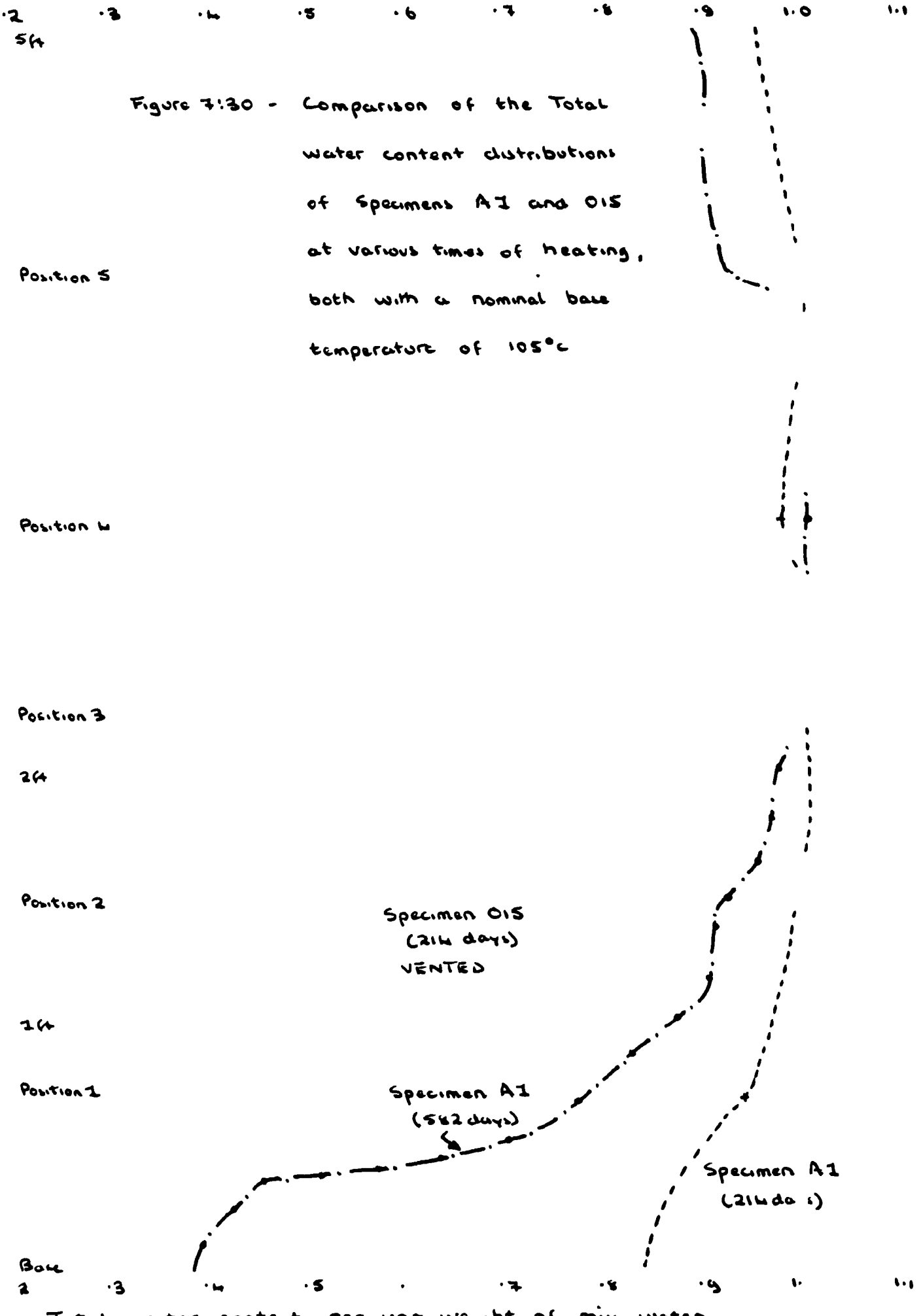


Figure 7:30 - Comparison of the Total water content distributions of Specimens A1 and 015 at various times of heating, both with a nominal base temperature of 105°c

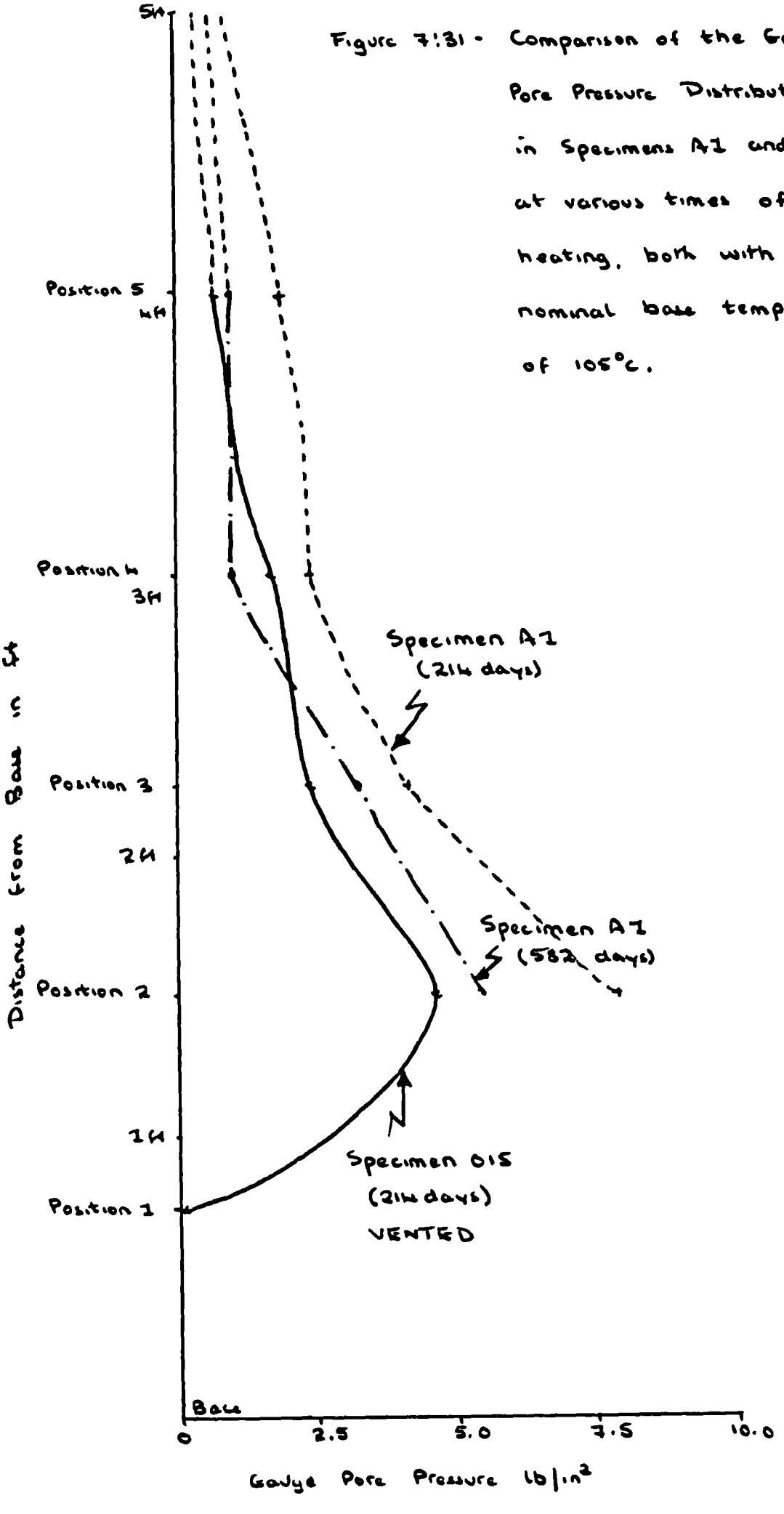


Figure 7:31 - Comparison of the Gauge Pore Pressure Distributions in Specimens A1 and 015, at various times of heating, both with a nominal base temperature of 105°C.

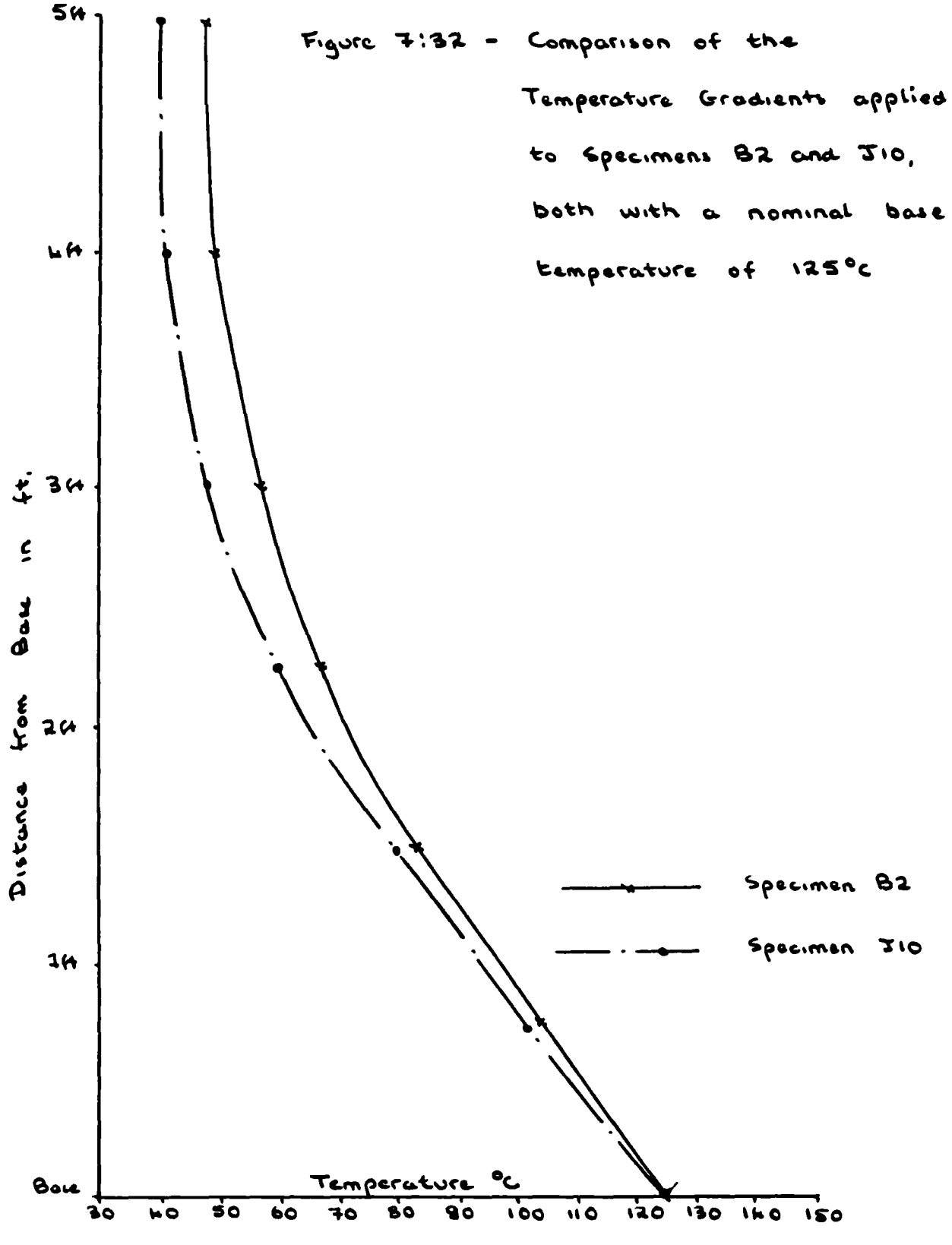


Figure 7:32 - Comparison of the Temperature Gradients applied to Specimens B2 and J10, both with a nominal base temperature of 125°C

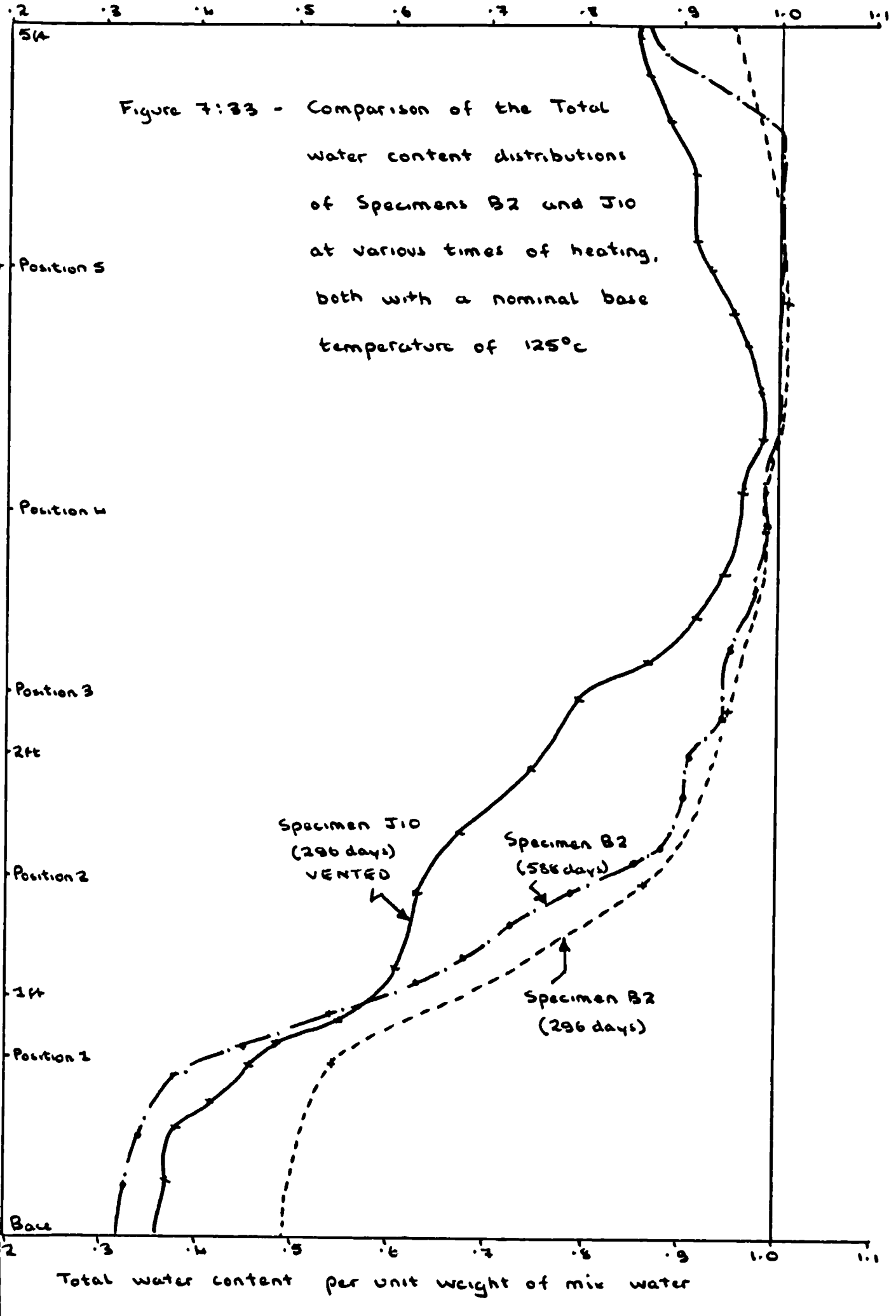


Figure 7:33 - Comparison of the Total water content distributions of Specimens B2 and J10 at various times of heating, both with a nominal base temperature of 125°C

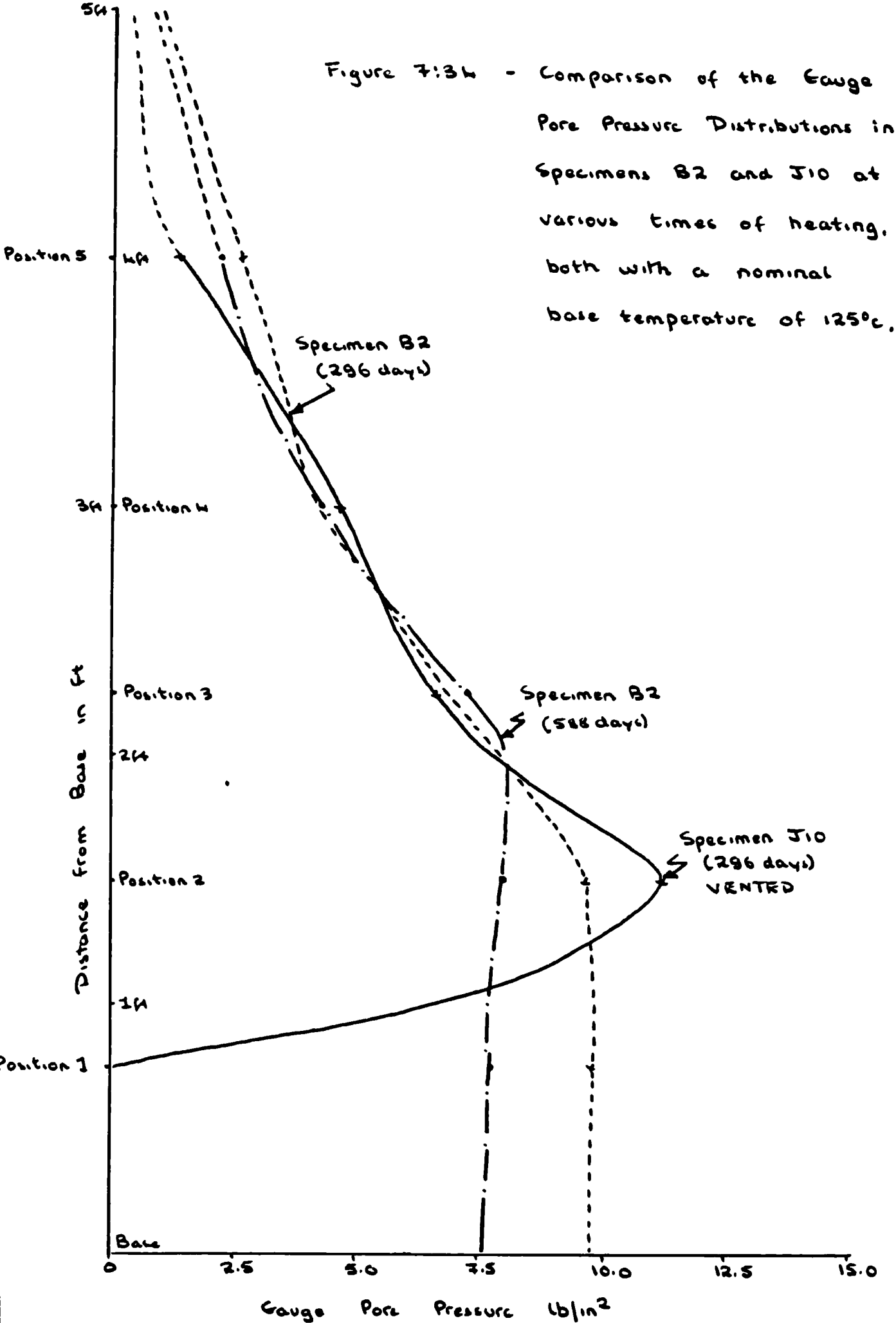
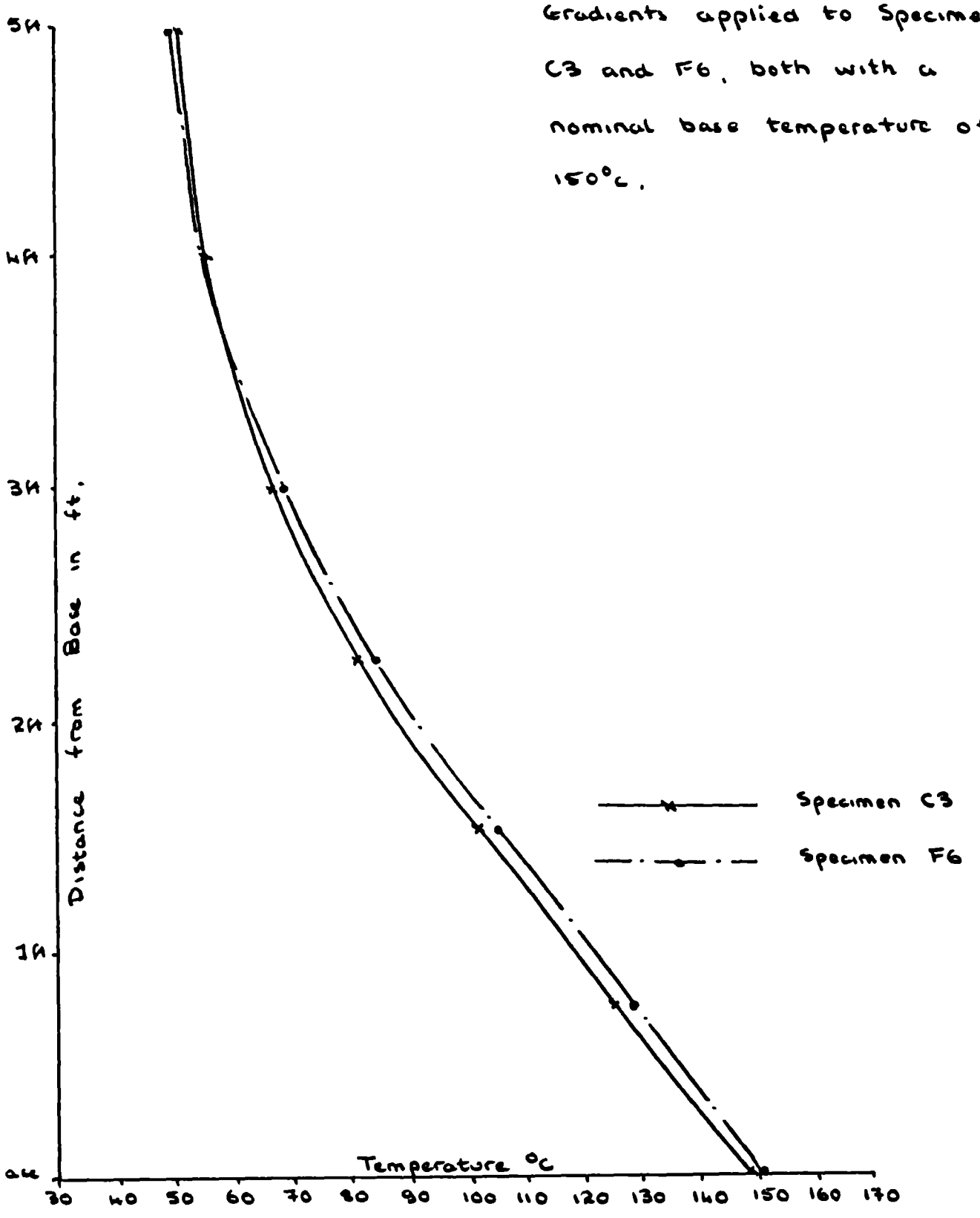


Figure 7:34 - Comparison of the Gauge Pore Pressure Distributions in Specimens B2 and J10 at various times of heating, both with a nominal base temperature of 125°C.

Figure 7:35 - Comparison of the Temperature Gradients applied to Specimens C3 and F6, both with a nominal base temperature of 150°C.



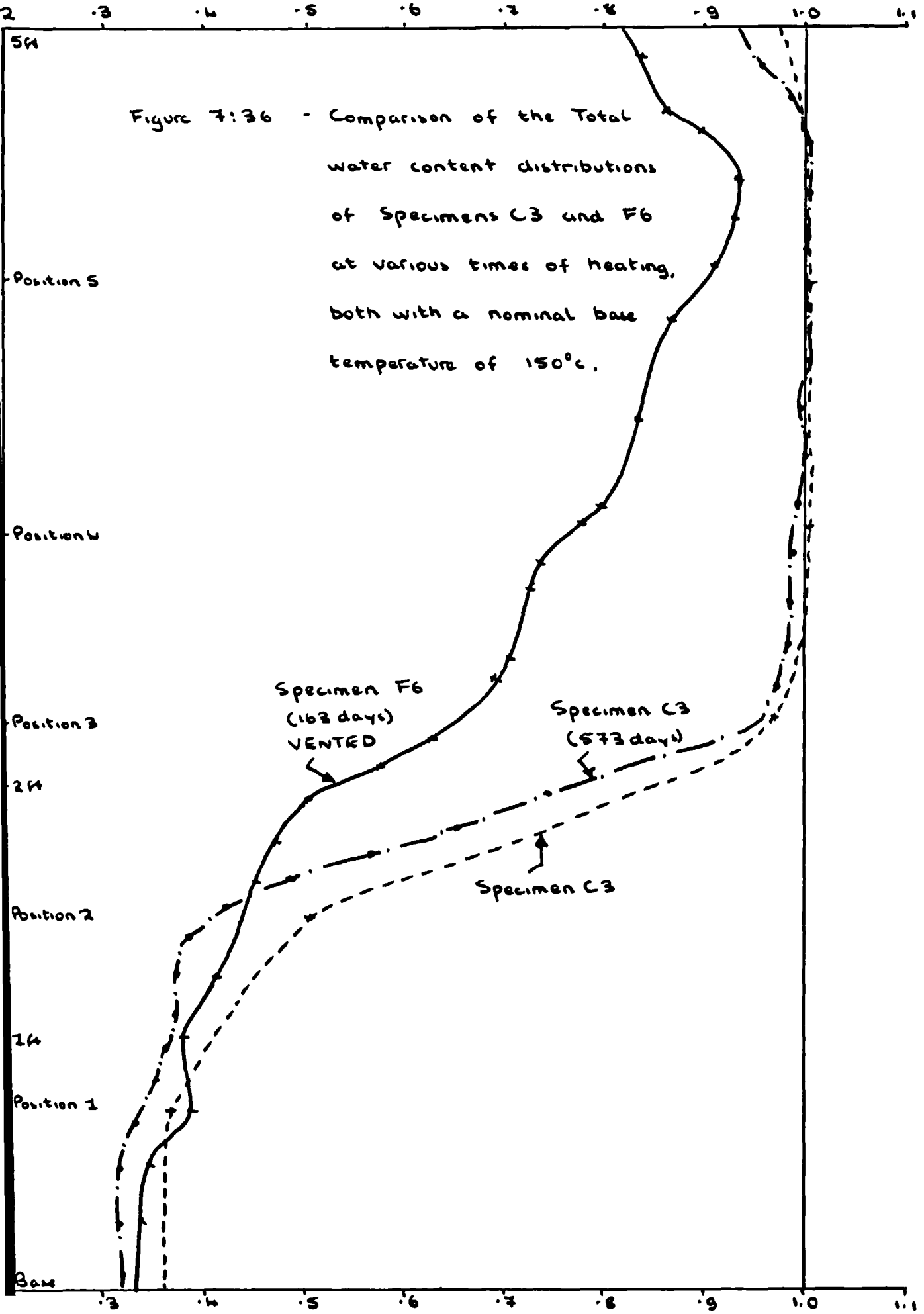


Figure 7:36 - Comparison of the Total water content distributions of Specimens C3 and F6 at various times of heating, both with a nominal base temperature of 150°c.

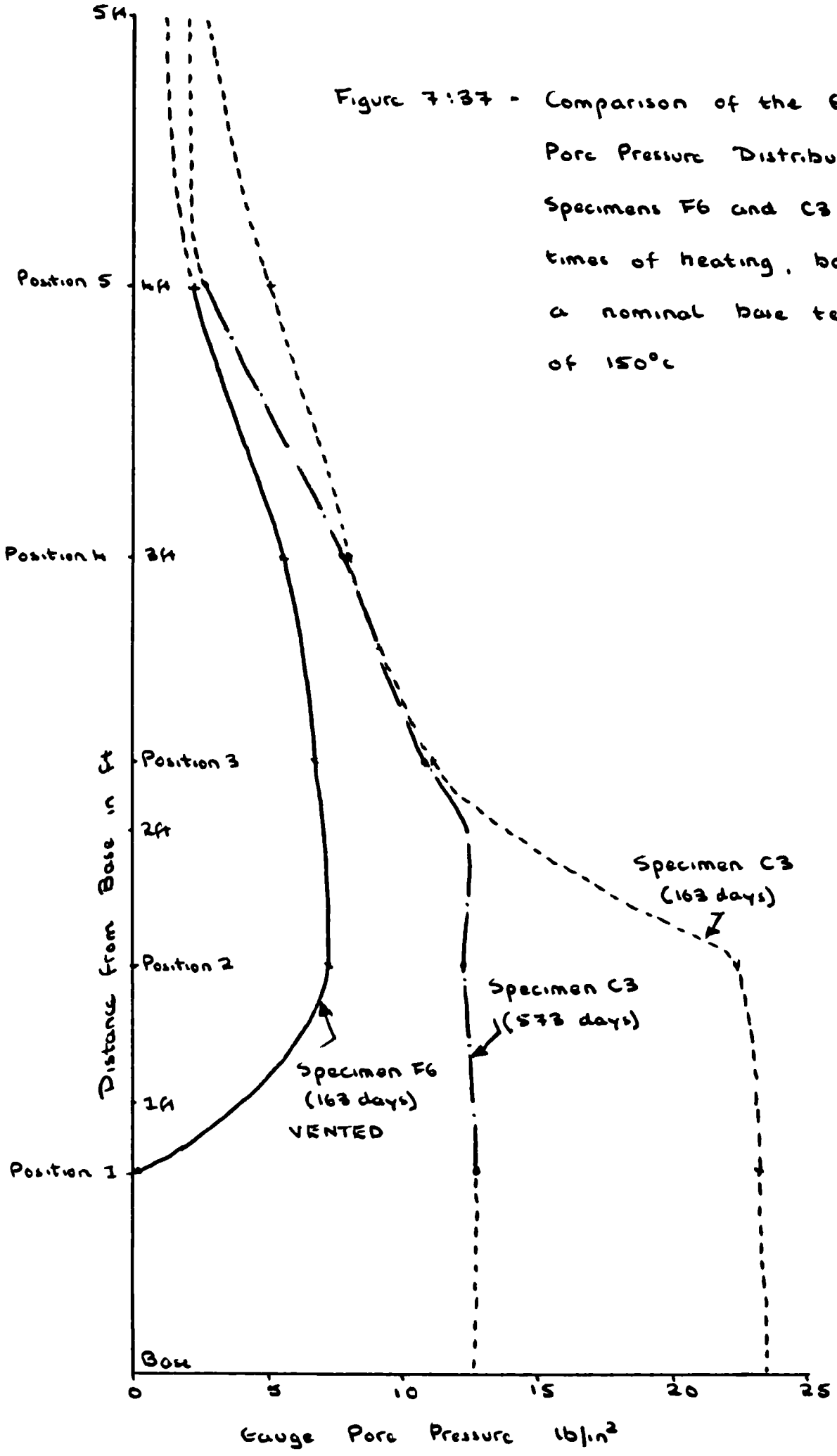
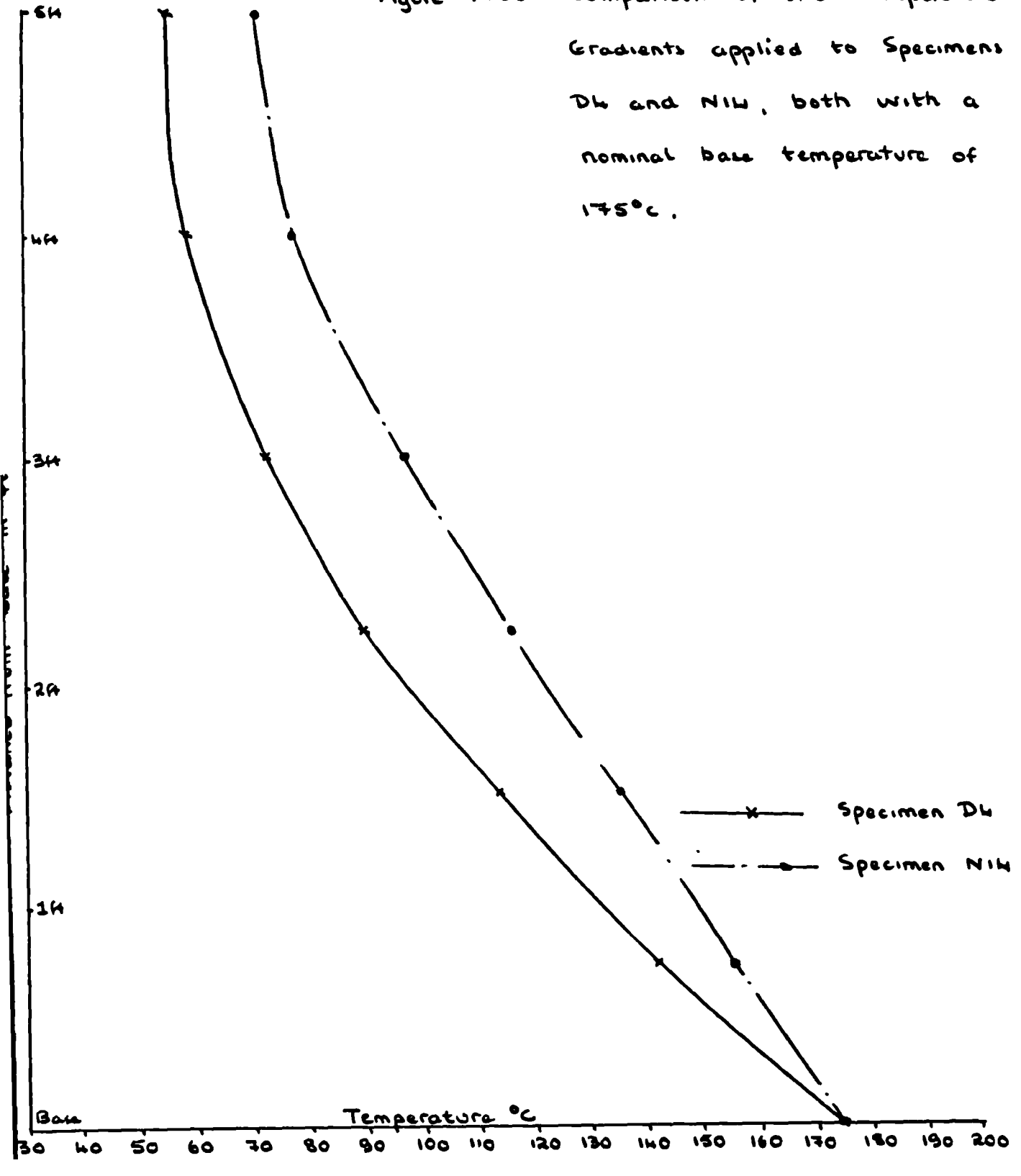


Figure 7:37 - Comparison of the Gauge Pore Pressure Distributions in Specimens F6 and C3 at various times of heating, both with a nominal base temperature of 150°C

Figure 7:38 - Comparison of the Temperature Gradients applied to Specimens DW and NIW, both with a nominal base temperature of 175°C.



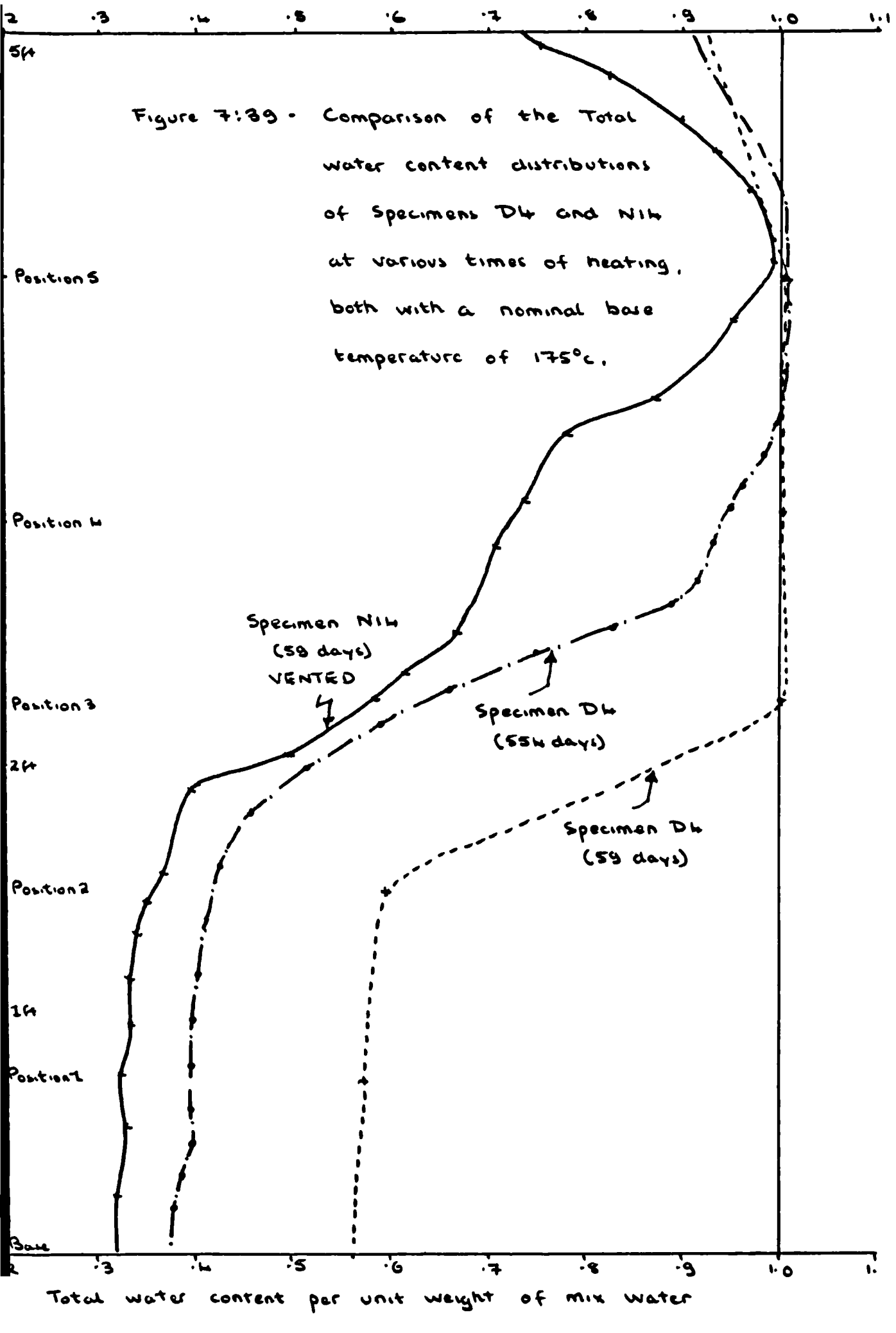


Figure 7:39 - Comparison of the Total water content distributions of Specimens D4 and N1H at various times of heating, both with a nominal base temperature of 175°c.

Figure 7:40 - Comparison of the Gauge Pore Pressure Distributions in Specimens Dw and N1w at various times of heating, both with a nominal base temperature of 175°C.

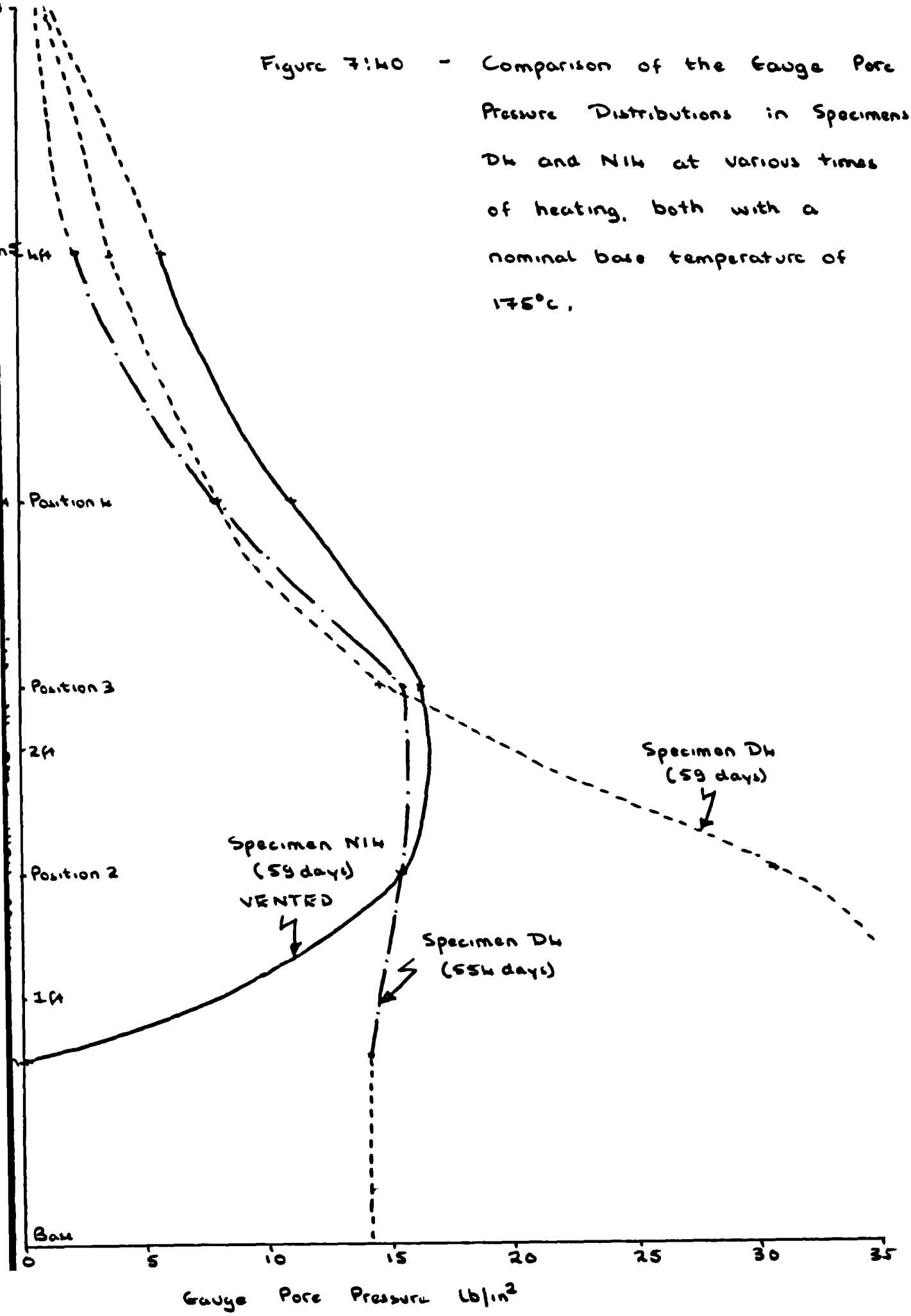
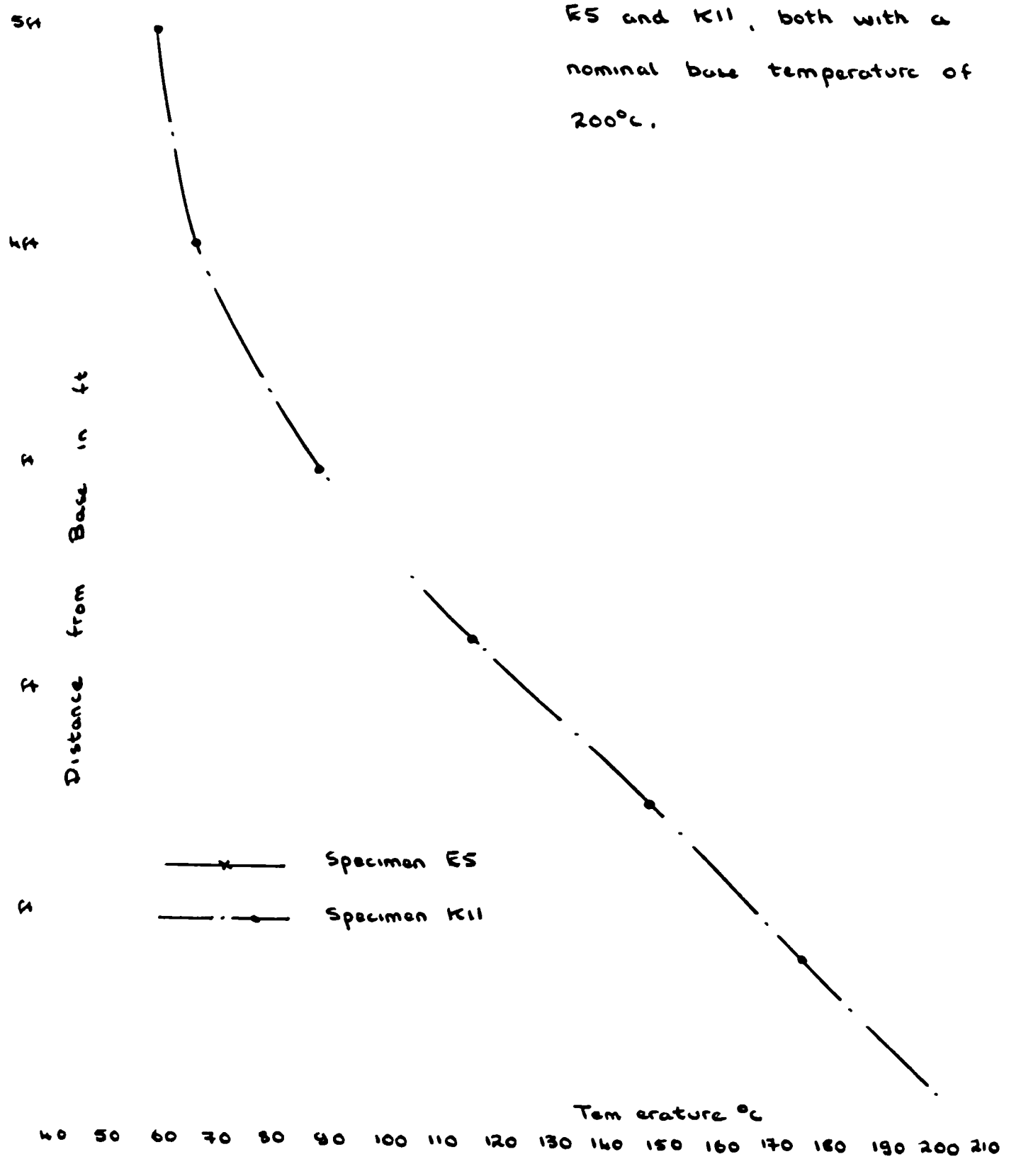


Figure 7:41 - Comparison of the Temperature Gradients applied to Specimens E5 and K11, both with a nominal base temperature of 200°C.



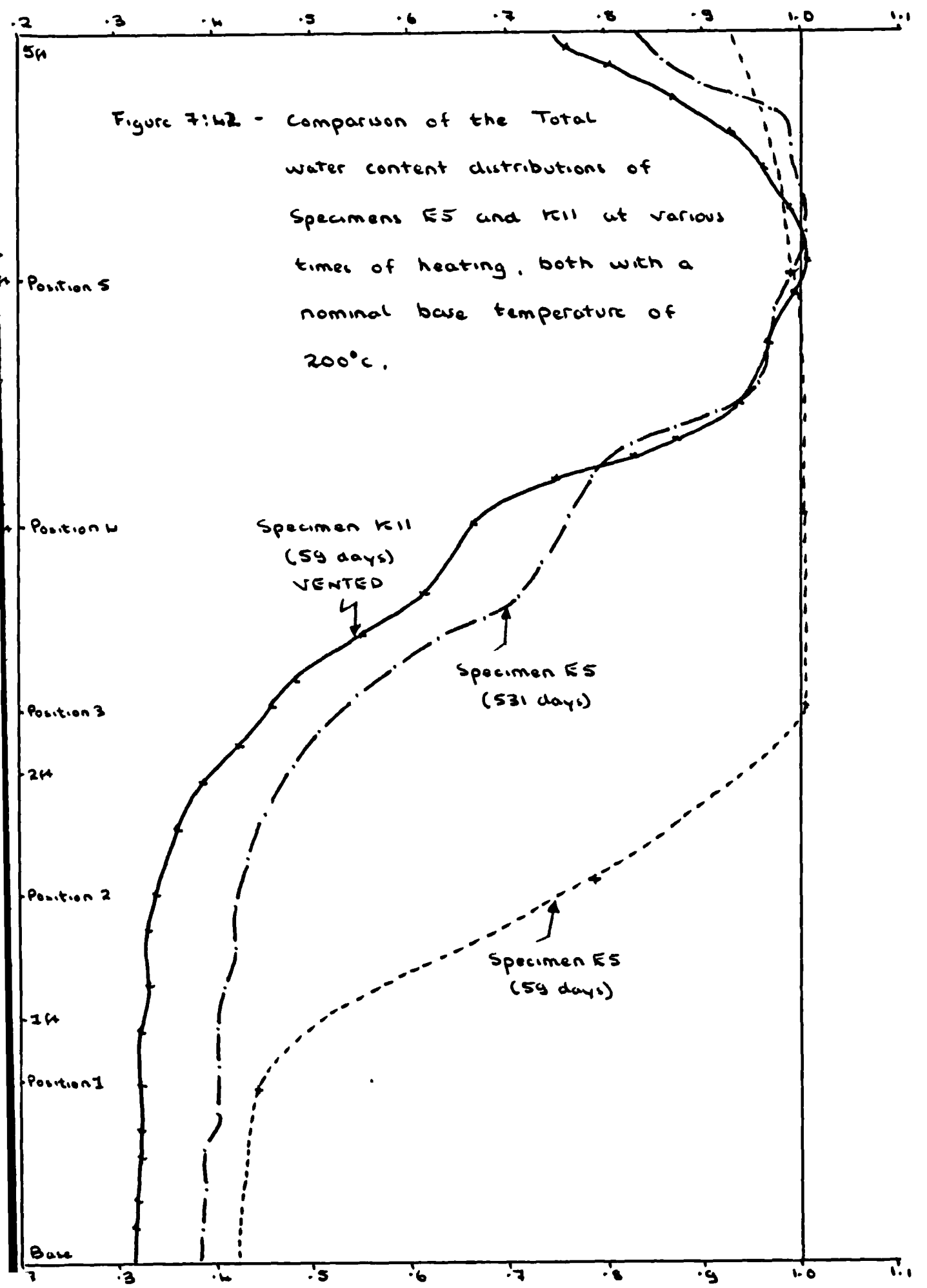
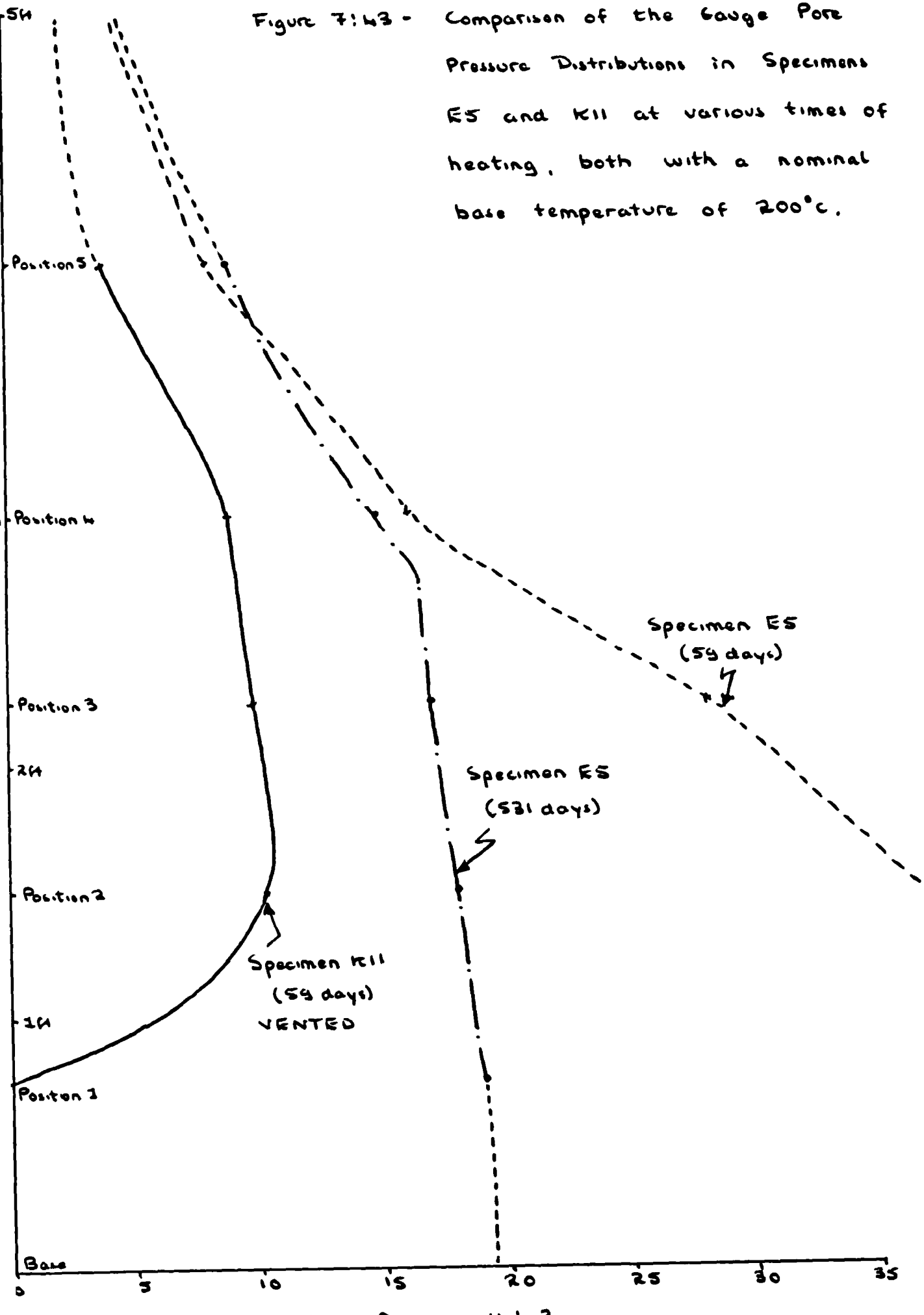


Figure 7:42 - Comparison of the Total water content distributions of Specimens E5 and K11 at various times of heating, both with a nominal base temperature of 200°C.

Figure 7:43 - Comparison of the Gauge Pore Pressure Distributions in Specimens E5 and K11 at various times of heating, both with a nominal base temperature of 200°C.



APPENDIX III - RESULTS OF VENTING SERIES TEST SPECIMENS.

FIGURES FOR APPENDIX III.

Figure APIII·1 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen F6 against time of heating.

Figure APIII:2 - Phase Diagram for water in specimen F6 at the end of time of heating of 163 days.

Figure APIII:3 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for Specimen F6.

Figure APIII·4 - Evaporable water distributions for Specimen F6 at various ages of heating.

Figure APIII 5 - Gauge Pore Pressures at the various instrumentation positions in Specimen F6 against time of heating.

Figure APIII·6 - Gauge Pore Pressure for Specimen F6 at various times of heating.

Figure APIII·7 - Evaporable water contents from the Moisture Meter Readings at the various instrumentation positions in Specimen G7 against time of heating.

Figure APIII·8 - Phase Diagram for water in Specimen G7 at the end of 163 days of heating.

Figure APIII·9 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for Specimen G7.

Figure APIII·10 - Evaporable water distributions for specimen G7 at various times of heating.

Figure APIII·11 - Gauge Pore Pressures at the various instrumentation positions in Specimen G7 against time of heating.

Figure APIII·12 - Gauge Pore Pressure distributions for Specimen G7 at various times of heating.

Figure \PIII:13 - Evaporable water contents from the Moisture Meter readings at the various instrumentation positions in Specimen H8 against time of heating.

Figure \PIII·14 - Phase Diagram for water in Specimen H8 at the end of 163 days of heating.

Figure \PIII:15 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for Specimen H8.

Figure \PIII·16 - Evaporable water distributions for Specimen H8 at various times of heating.

Figure \PIII:17 - Gauge Pore Pressures at the various instrumentation positions in Specimen H8 against time of heating.

Figure \PIII:18 - Gauge Pore Pressure distributions for Specimen H8 at various times of heating.

Figure \PIII:19 - Evaporable water contents from the Moisture Meter Readings at the various instrumentation positions in Specimen K11 against time of heating.

Figure \PIII 20 - Phase Diagram for water in Specimen K11 at the end of 59 days of heating.

Figure \PIII·21 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final moisture Meter readings for Specimen K11.

Figure \PIII 22 - Evaporable water distributions for specimen K11 at various times of heating

Figure \PIII·23 - Gauge Pore Pressures at the various instrumentation positions in Specimen K11 against time of heating.

Figure \PIII:24 - Gauge Pore Pressure distributions for Specimen K11 at various times of heating.

Figure \PIII·25 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen N14 against time of heating.

Figure \PIII 26 - Phase Diagram for Water in specimen N14 at the end of 59 days of heating.

Figure APIII.27 - Comparison of the evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for specimen N14.

Figure APIII·28 - Evaporable water distributions for Specimen N14 at various times of heating.

Figure APIII·29 - Gauge Pore Pressures at the various instrumentation positions in Specimen N14 against time of heating.

Figure APIII·30 - Gauge Pore Pressure Distributions for specimen N14 at various times of heating.

Figure APIII:31 - Evaporable water contents from the Moisture Meter readings at the various instrumentation positions in Specimen O15 against time of heating.

Figure APIII·32 - Phase Diagram for water in Specimen O15 at the end of 214 days of heating.

Figure APIII·33 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter readings for specimen O15.

Figure APIII.34 - Evaporable water distributions for Specimen O15 at various times of heating.

Figure APIII 35 - Gauge Pore Pressures at the various instrumentation positions in Specimen O15 against time of heating.

Figure APIII·35 - Gauge Pore Pressure Distributions for specimen O15 at various ages of heating.

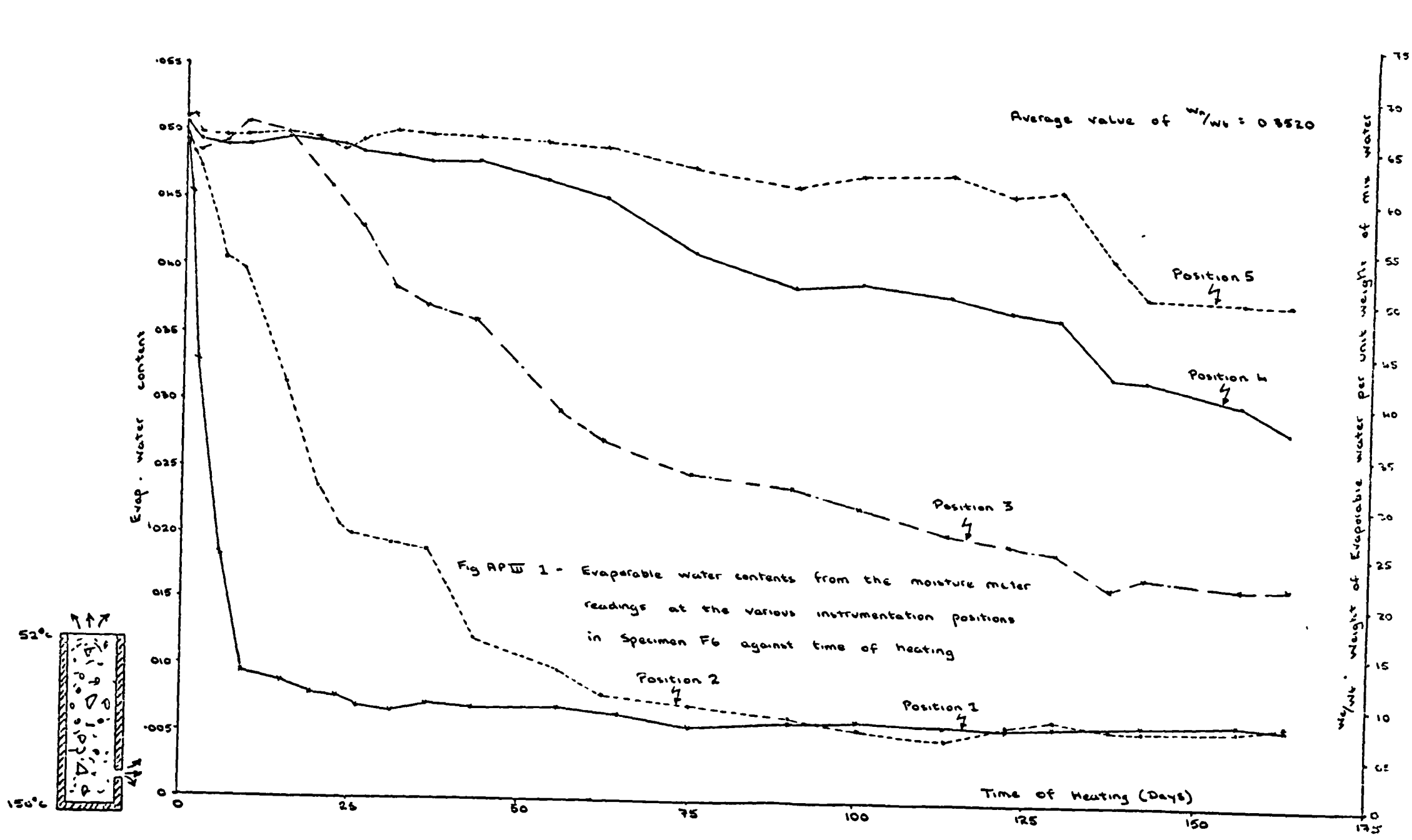


Fig APIII 1 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen F6 against time of heating

0·82

W_n/W_t : Weight of non-evaporable water per unit weight of mix water

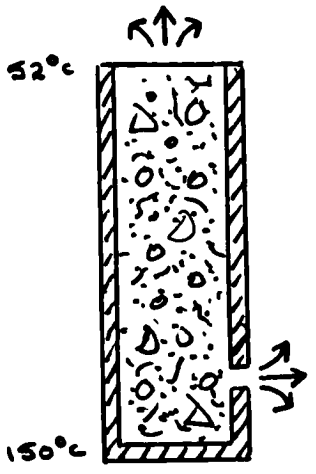
0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1

4H

Figure AP III:2 - Phase Diagram for Water in Specimen F6 at the end of time of heating of 163 days.

4H

1



3H

Evaporable water distribution

2H

Non-Evaporable water distribution

1H

= Area of water loss.

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

W_e/W_t : Weight of Evaporable water per unit weight of mix water

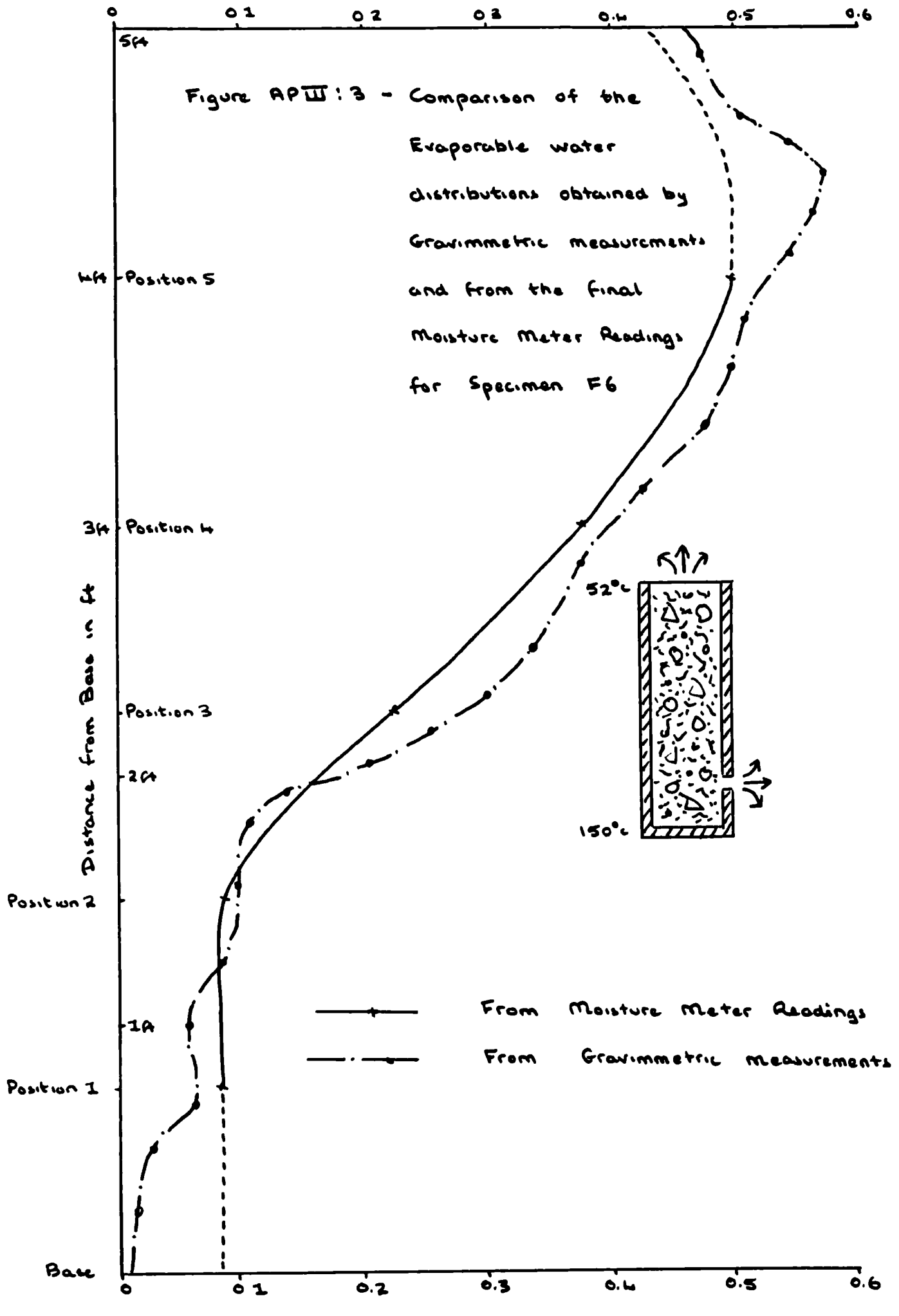


Figure APIII : 3 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen F6

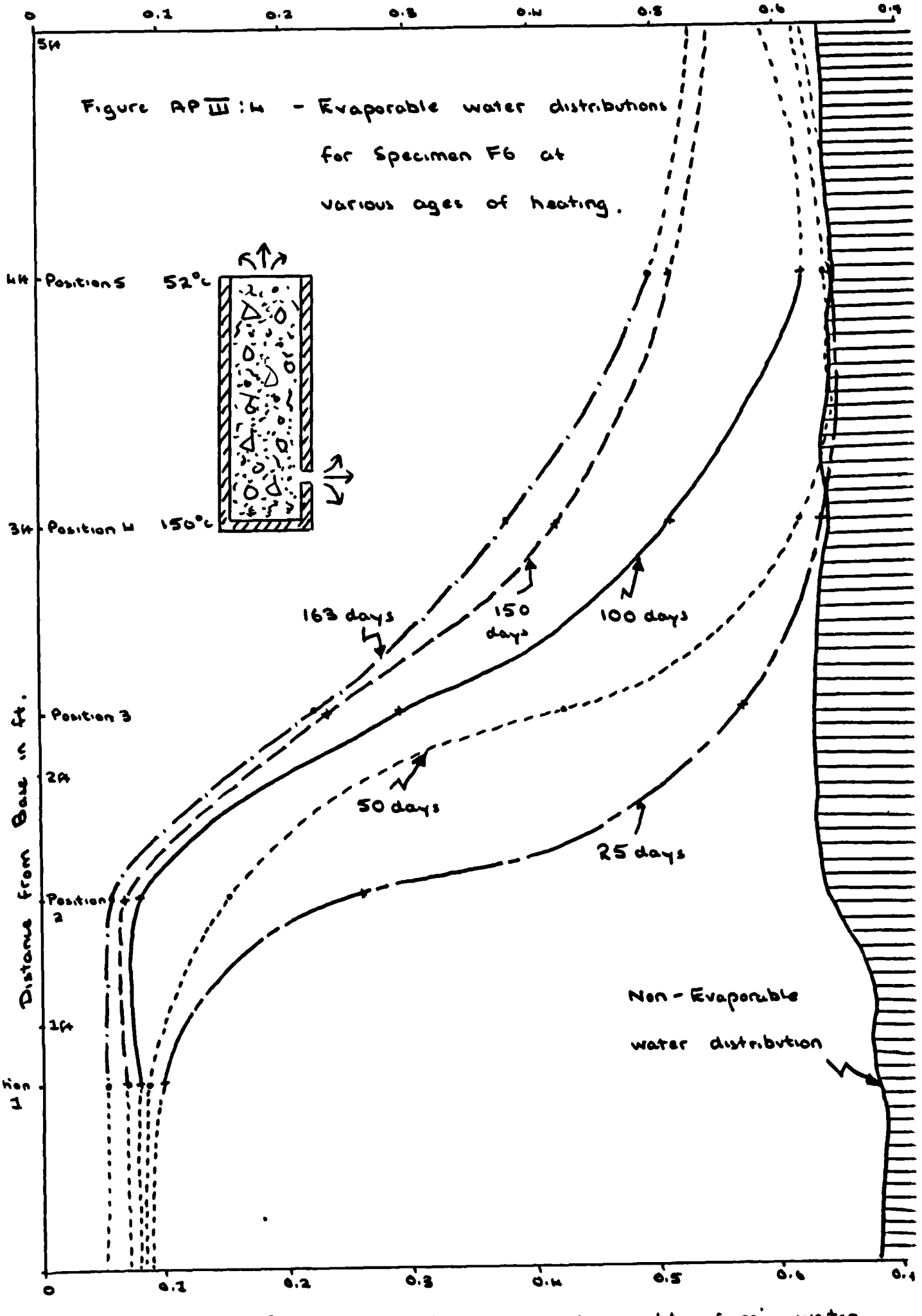


Figure AP III : 4 - Evaporable water distributions for Specimen F6 at various ages of heating.

Fig AP III · 5 - Gauge Pore Pressures at the various instrumentation positions in Specimen F6 against time of heating.

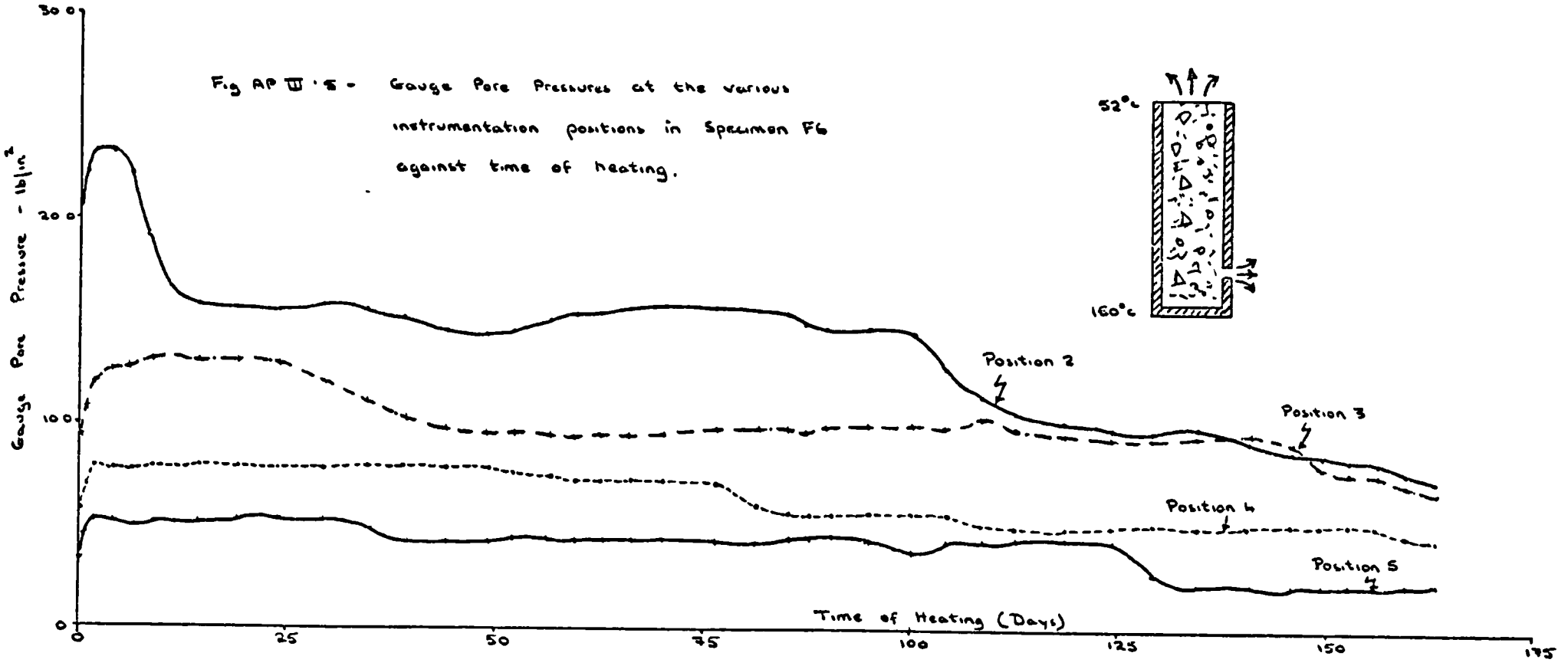
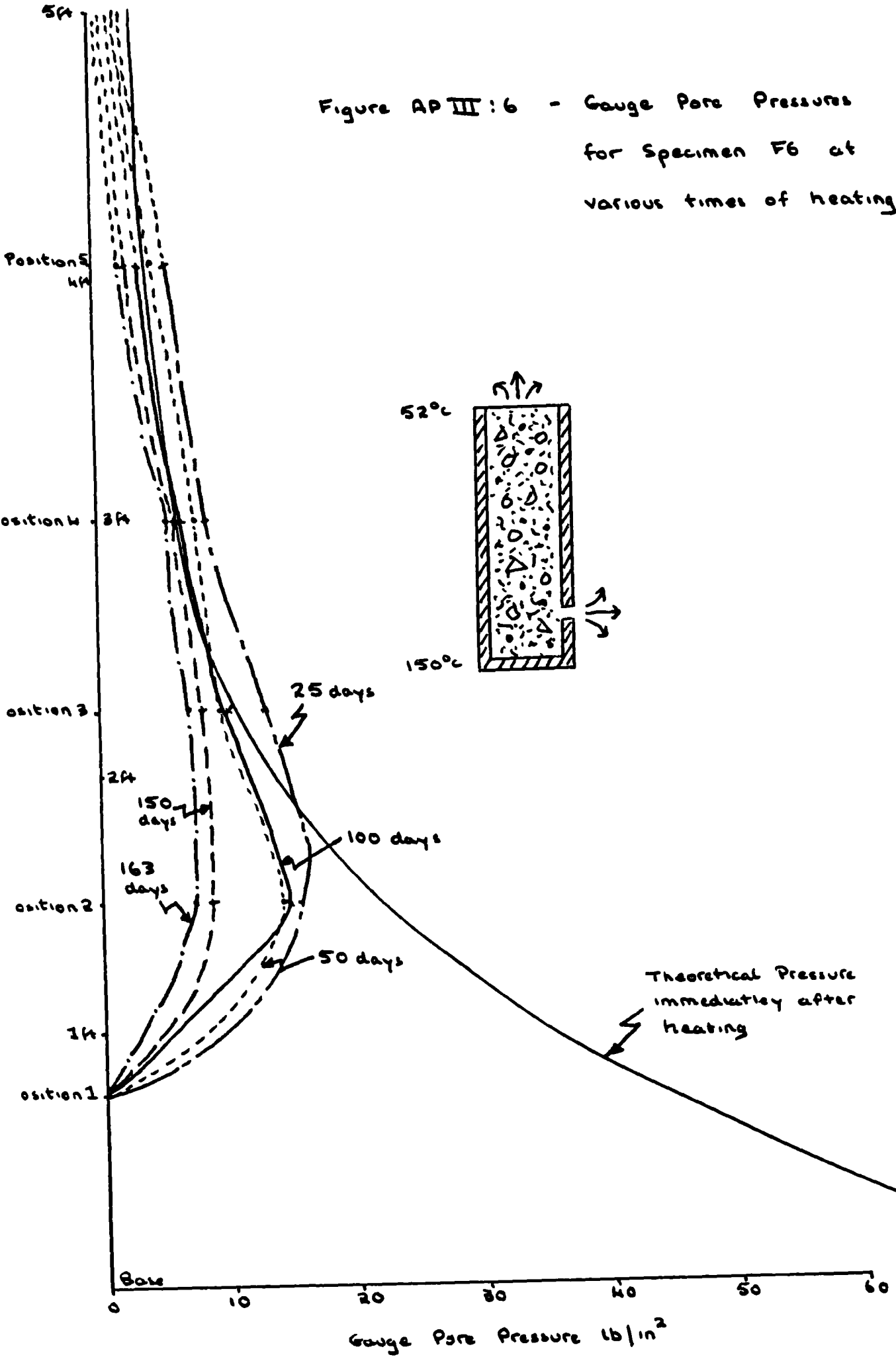


Figure AP III : 6 - Gauge Pore Pressures for Specimen F6 at various times of heating



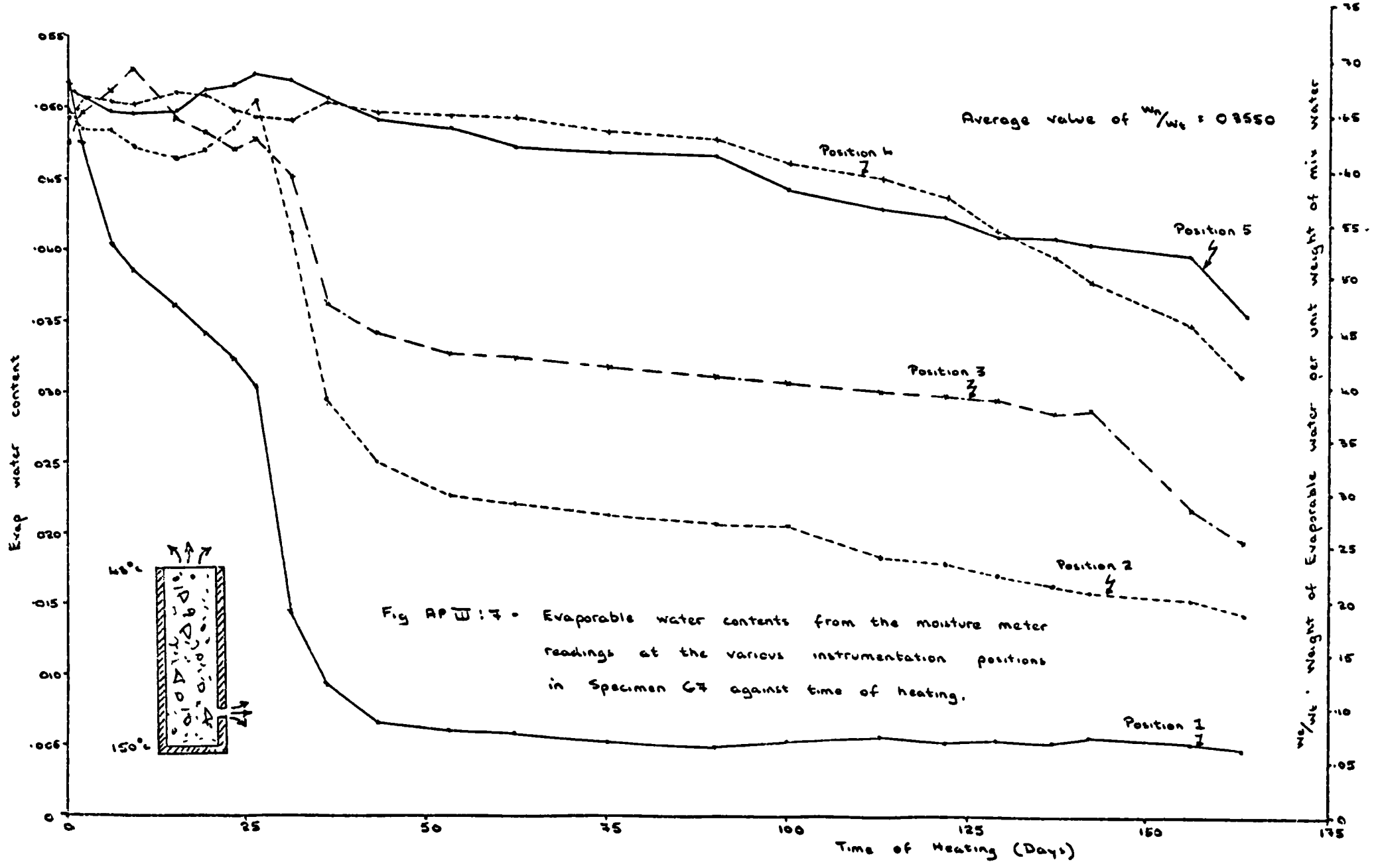


Fig AP III : 7 · Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen G7 against time of heating.

w_n/w_t : Weight of non-evaporable water per unit weight of mix water

1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1

5ft

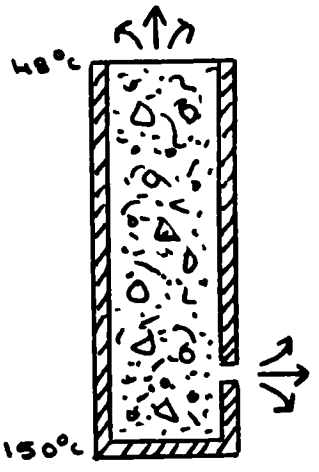
4ft

3ft

2ft

1ft

Figure APIII:8 - Phase Diagram for water in Specimen 67 at the end of 163 days of heating.



Evaporable water distribution

Non-Evaporable water distribution

Area of Water Loss

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

w_e/w_t : Weight of Evaporable water per unit weight of mix water

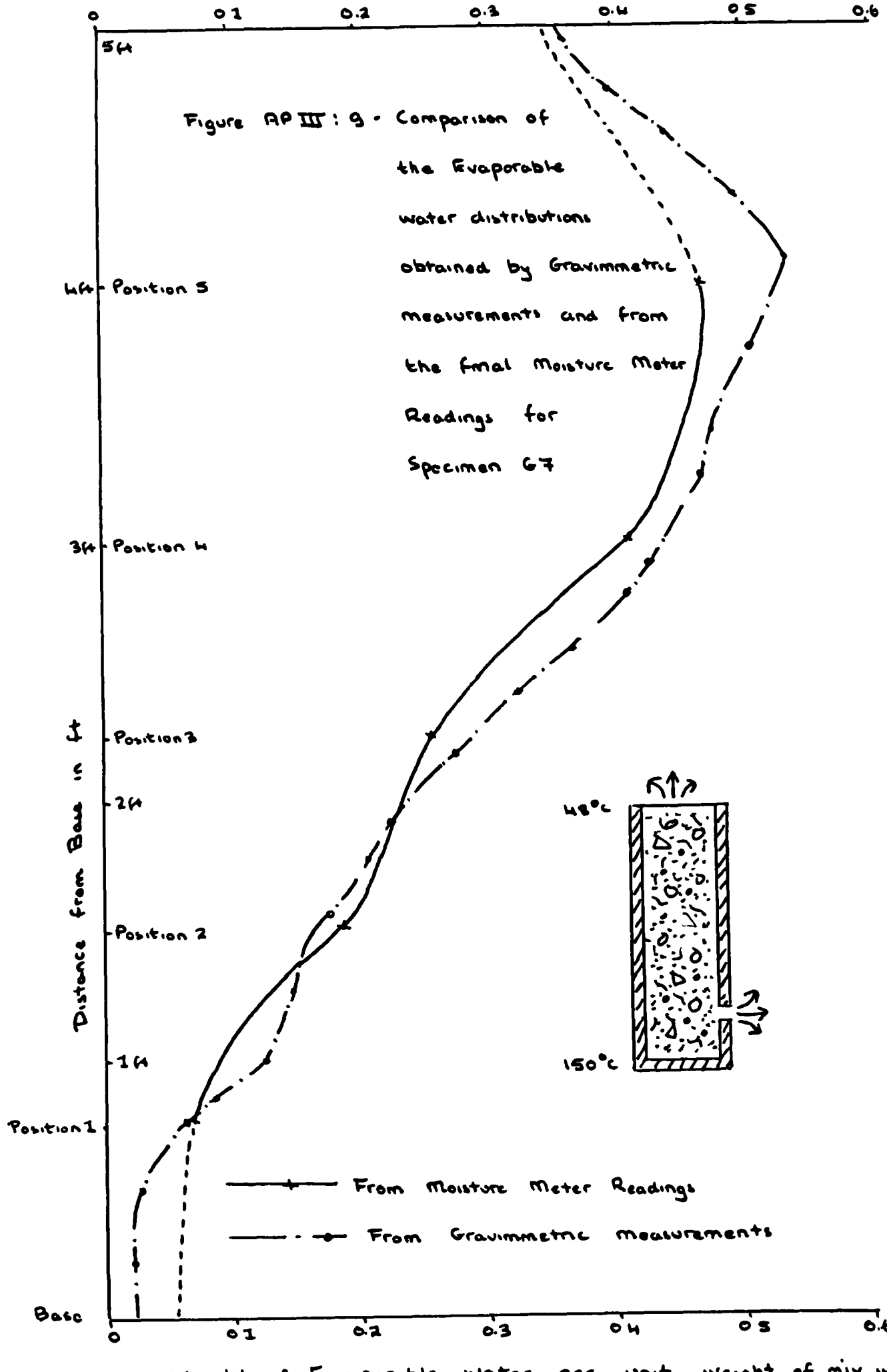


Figure AP III : 9 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen G7

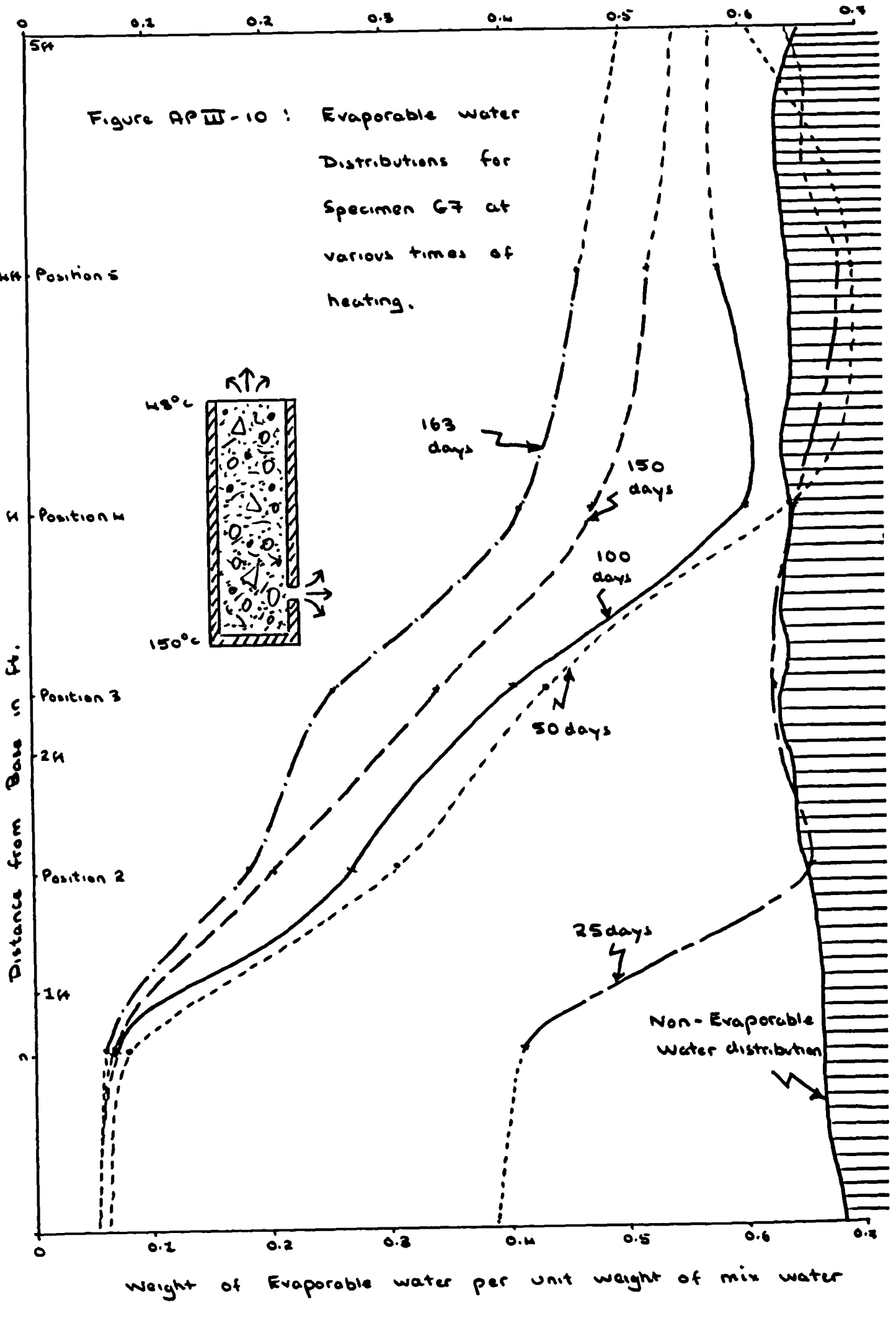


Figure AP III-10 : Evaporable water Distributions for Specimen G7 at various times of heating.

Fig AP III : 11 - Gauge Pore Pressures at the various instrumentation positions in Specimen G7 against time of heating.

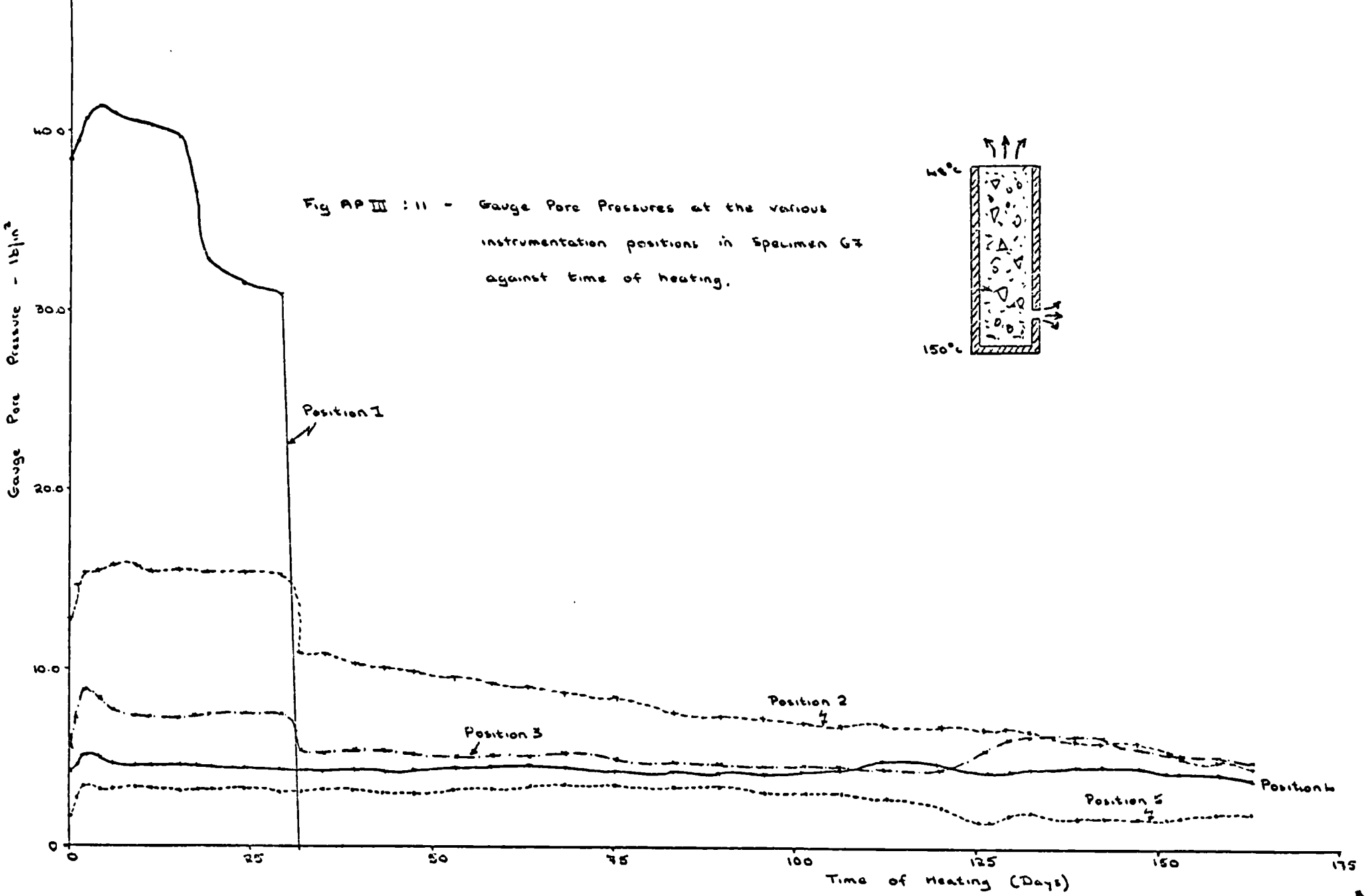
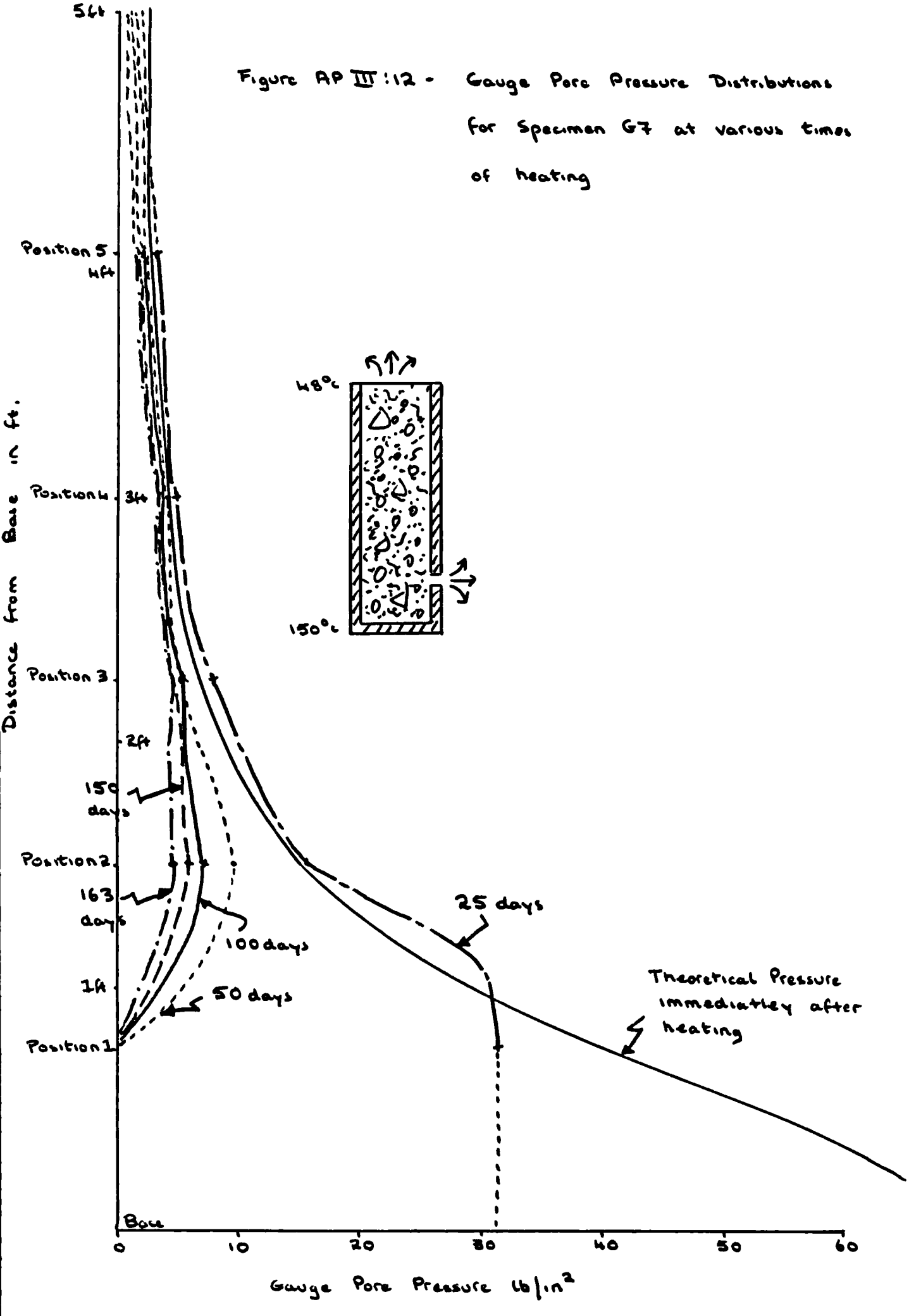


Figure AP III:12 - Gauge Pore Pressure Distributions for Specimen G7 at various times of heating



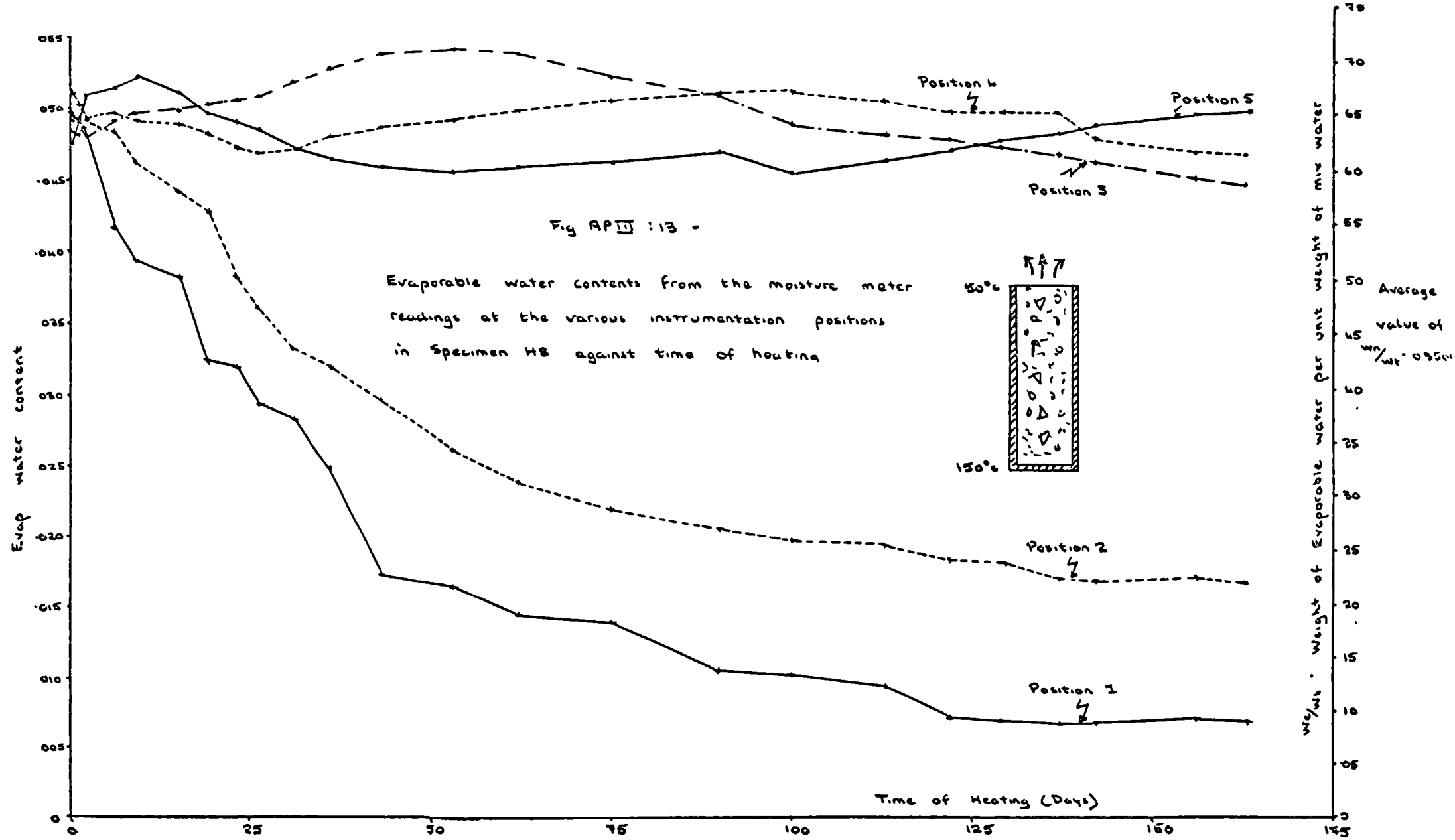

Position 4
Position 5
Position 3
Position 2
Position 1
50°c
150°c
Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen H8 against time of heating
Evap water content
Time of Heating (Days)
Average value of
0
25
50
75
100
125
150
175

Fig AP III : 13 -

w_n/w_t: Weight of non-evaporable water per unit weight of mix water

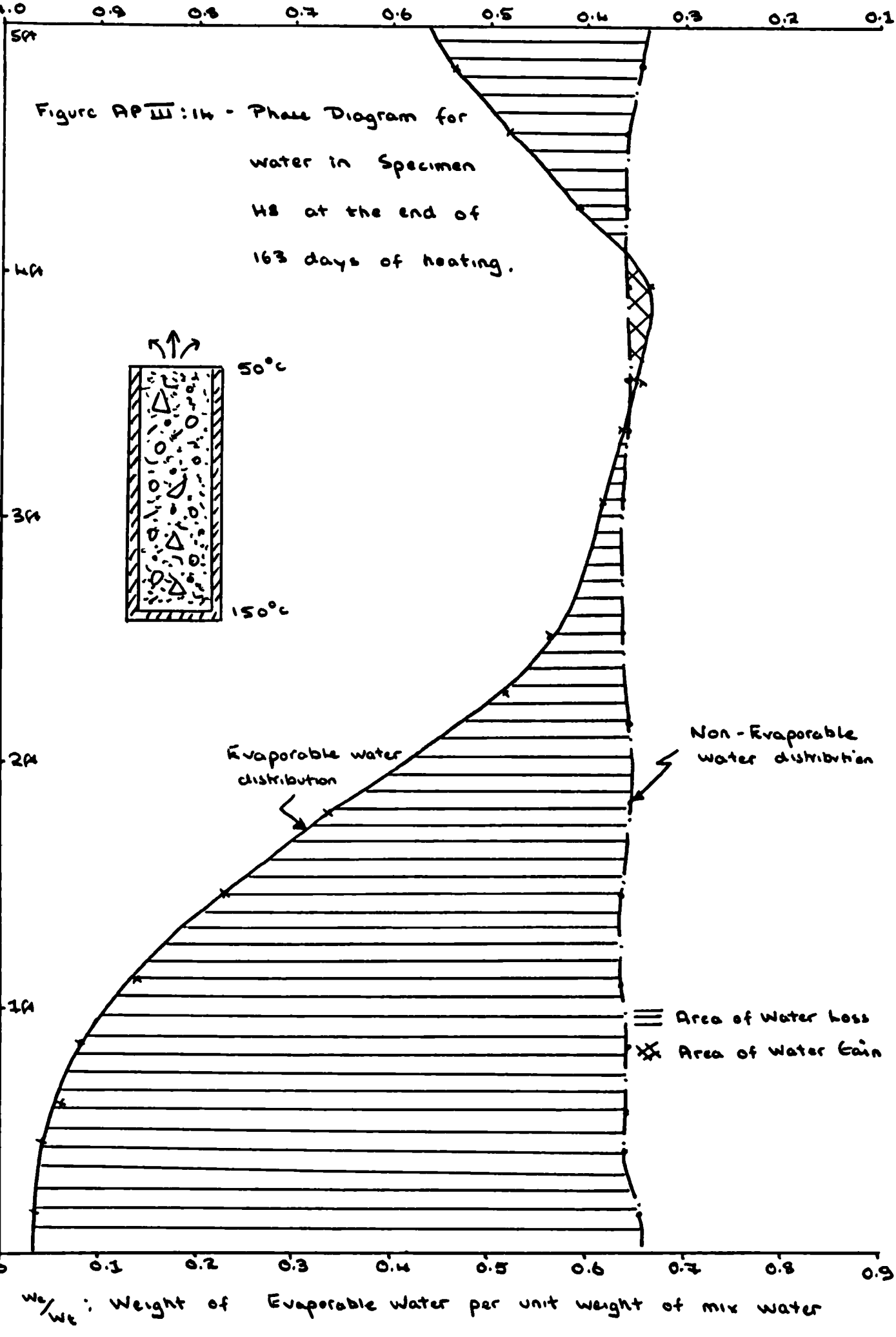


Figure AP III: 14 - Phase Diagram for water in Specimen H8 at the end of 163 days of heating.

w_e/w_t: Weight of Evaporable water per unit weight of mix water

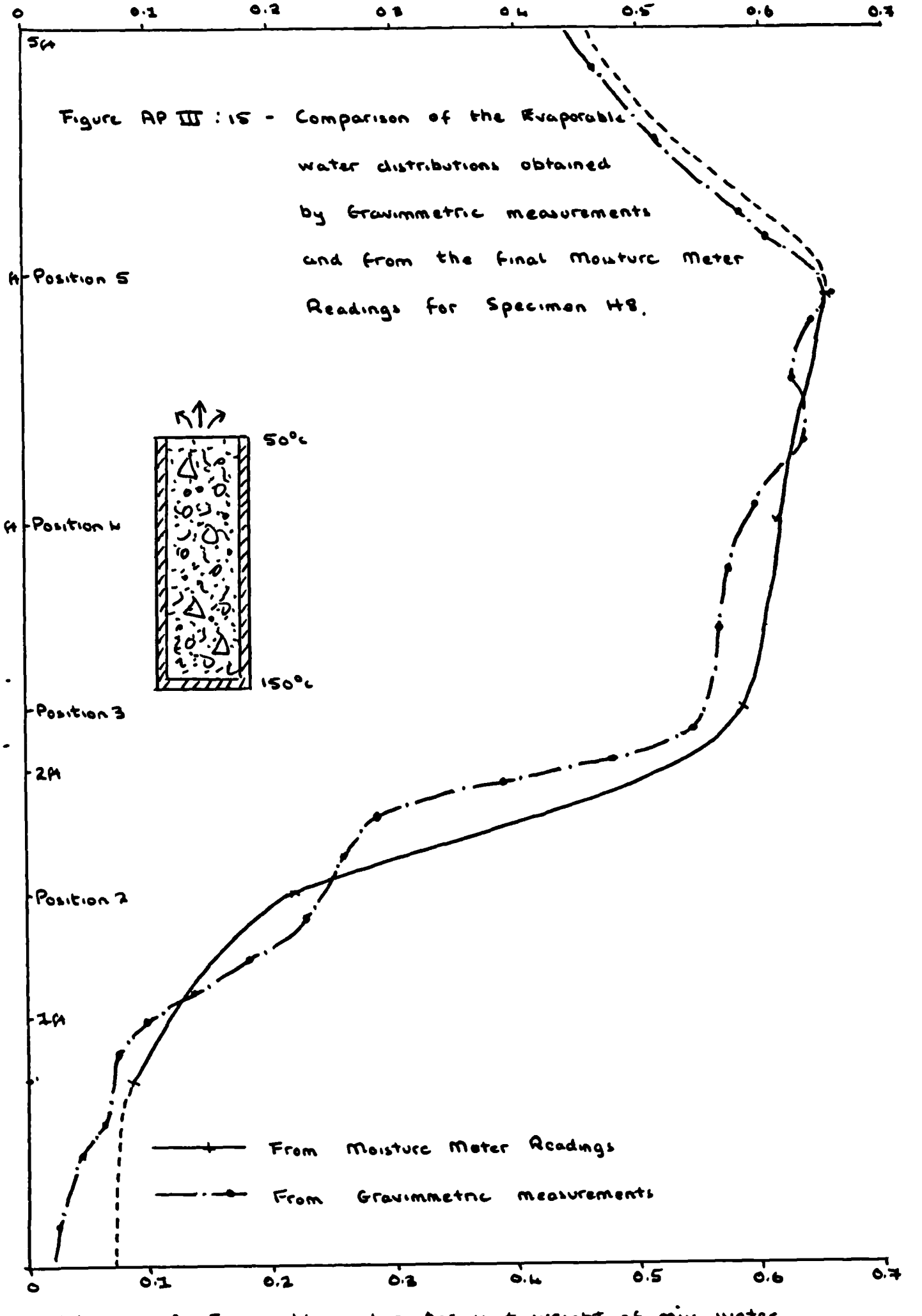


Figure AP III : 15 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen H8.

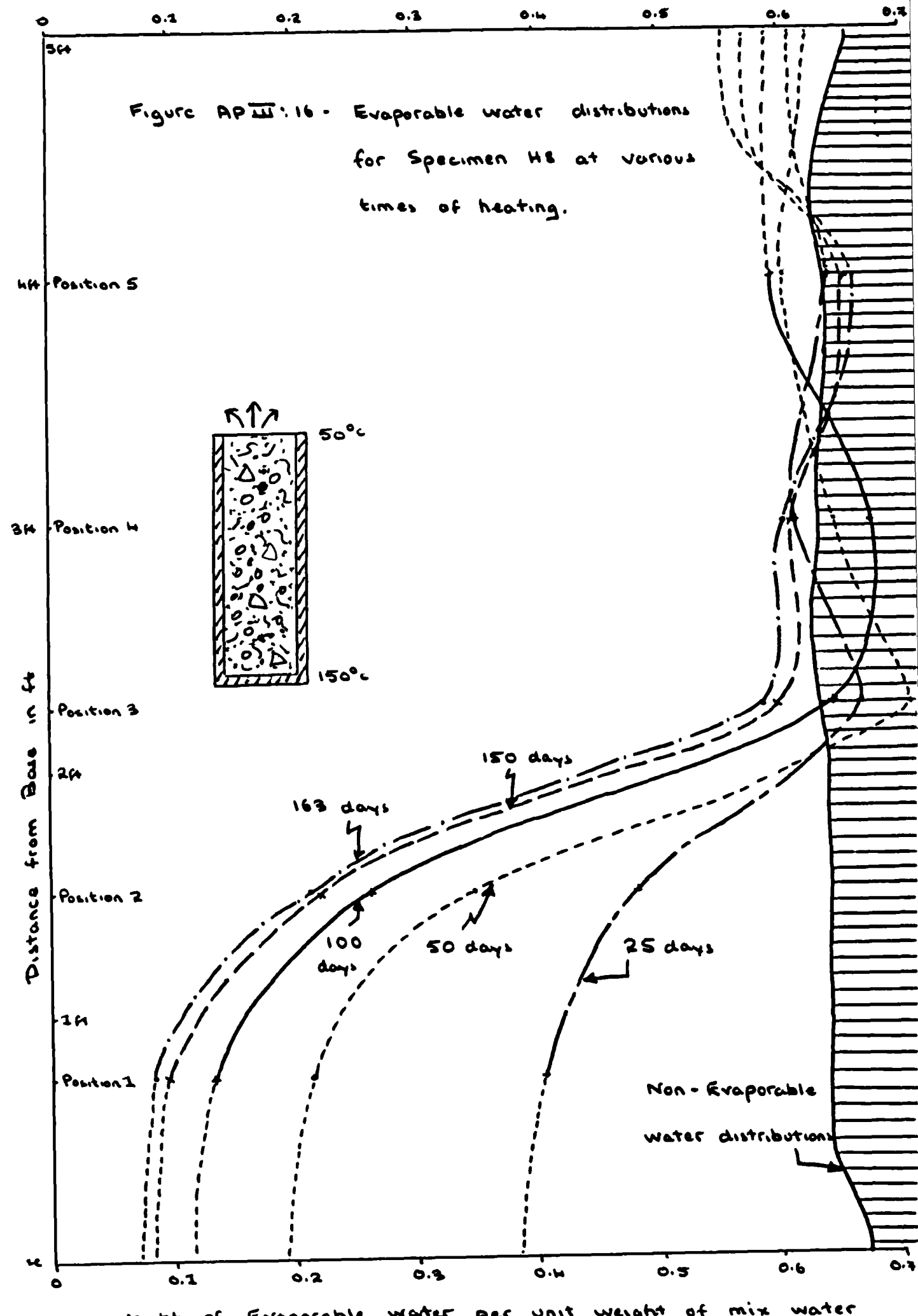
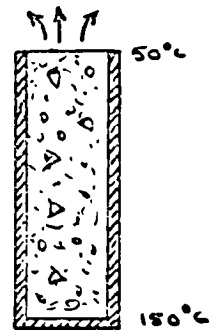


Figure AP III. 16 - Evaporable water distributions for Specimen H8 at various times of heating.

Fig AP III - 13 - Gauge Pore Pressures at the various instrumentation positions in Specimen H8 against time of heating.



Gauge Pore Pressure - lb/in^2

40.0
30.0
20.0
10.0
0

Position 1
Position 2
Position 3
Position 4
Position 5

0 25 50 75 100 125 150 175

Time of Heating (Days)

Figure AP III : 18 - Gauge Pore Pressure Distributions for Specimen H8 at various times of heating

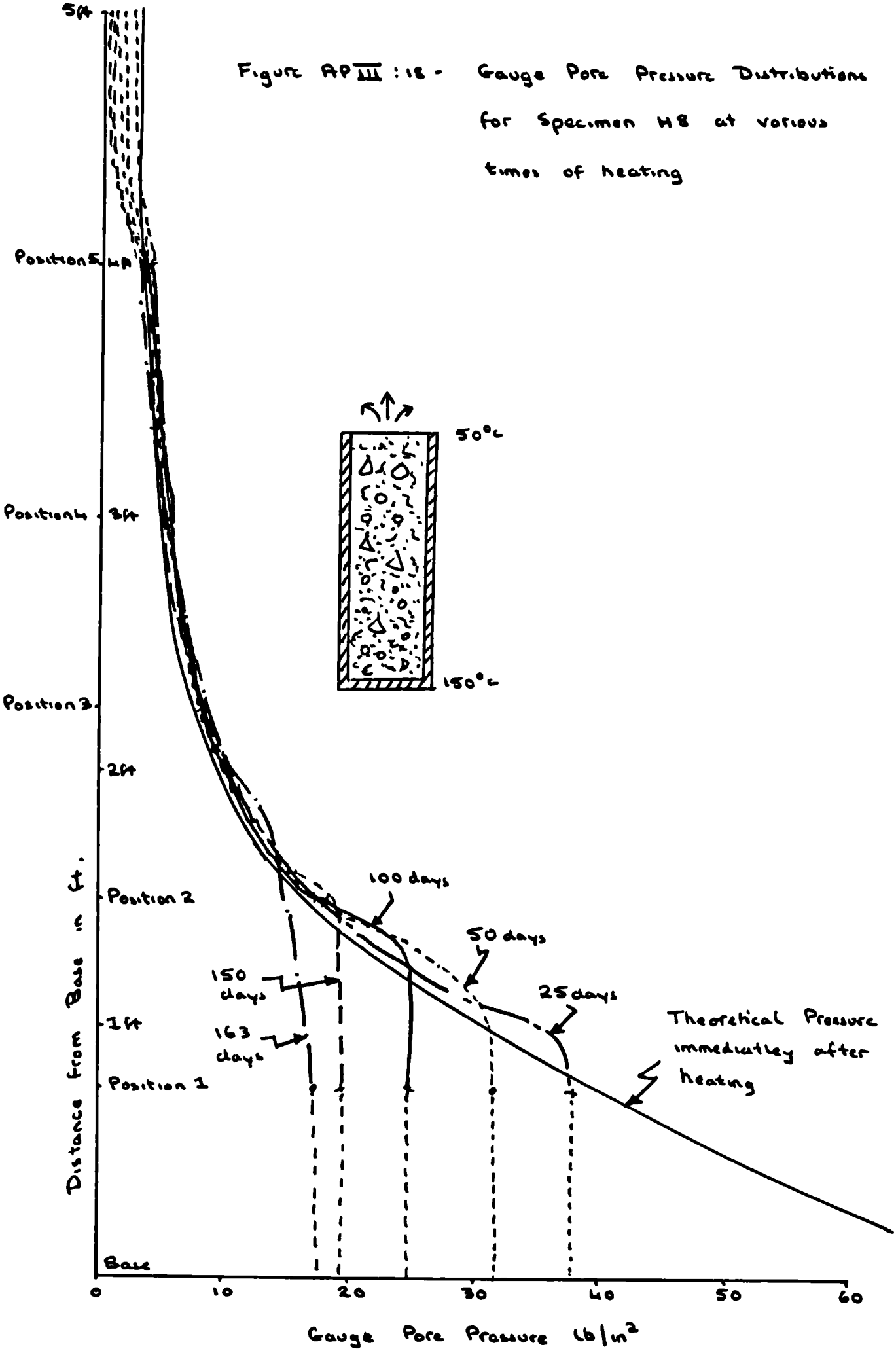
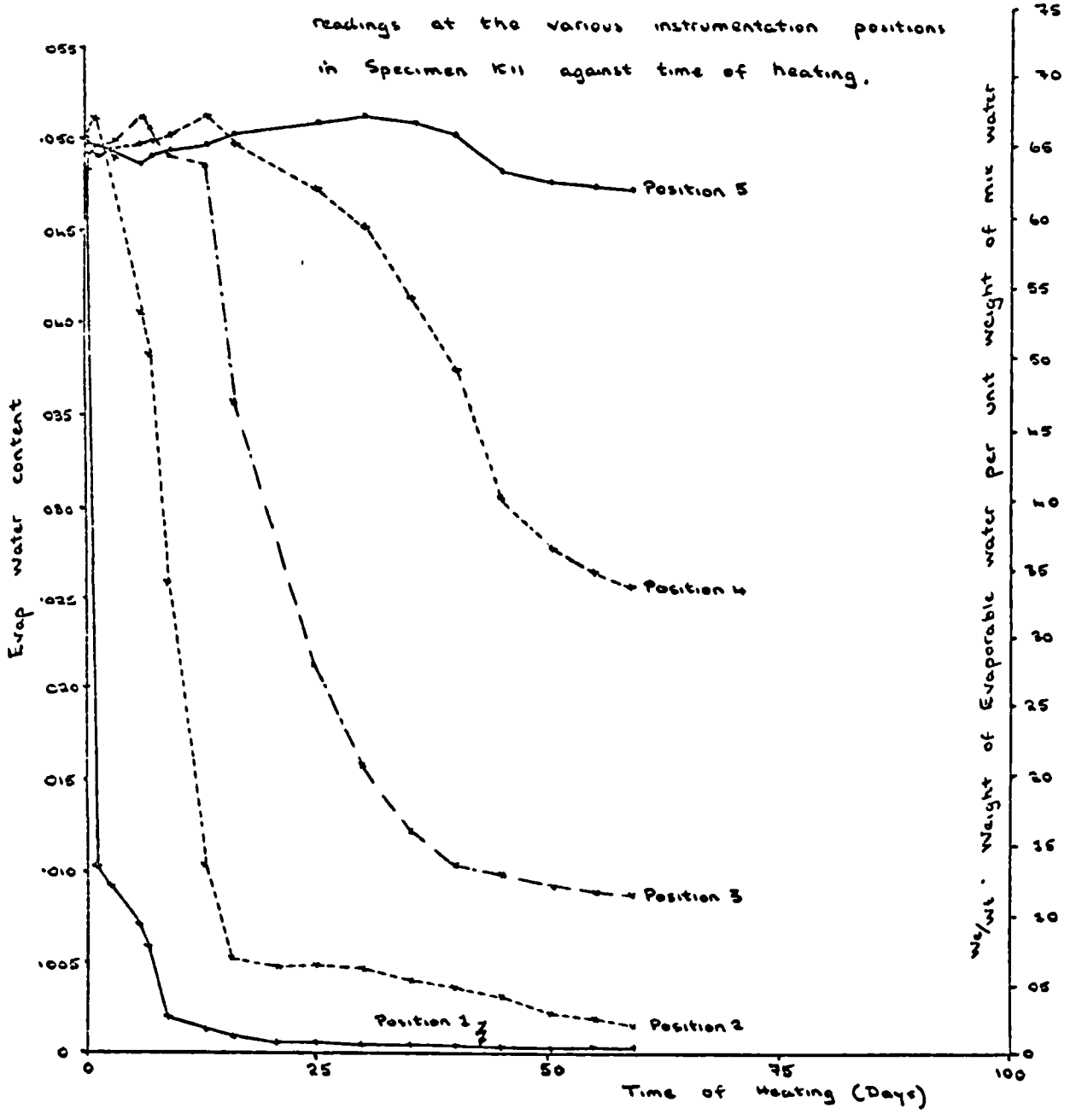
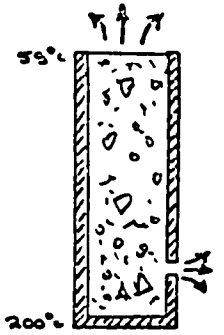
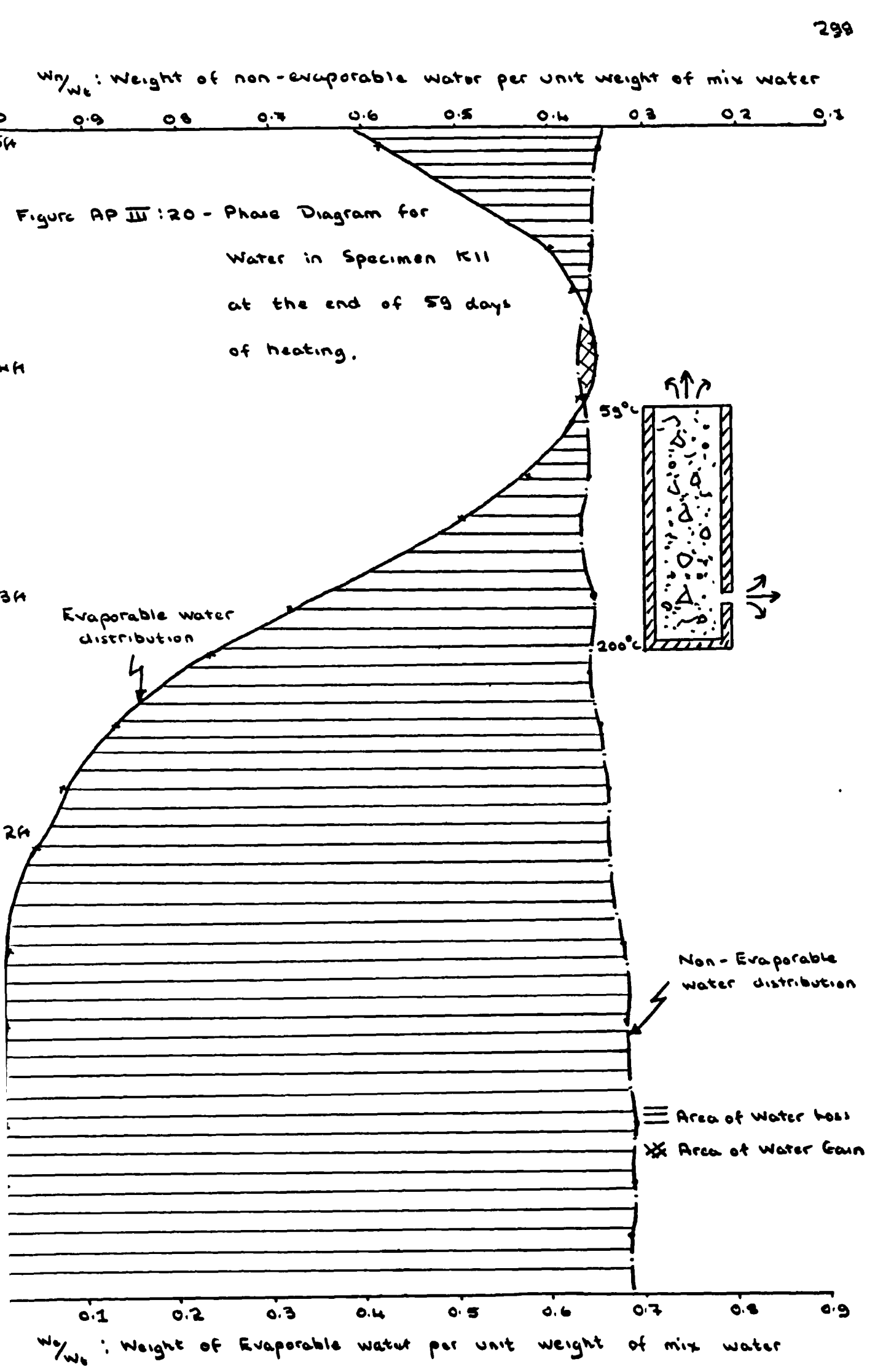


Fig AP III · 19 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen K11 against time of heating.



Average value of W_e/W_t = 0·3400




W_n/W_e : Weight of non-evaporable water per unit weight of mix water
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
Figure AP III : 20 - Phase Diagram for Water in Specimen K11 at the end of 59 days of heating.
59°C
200°C
Evaporable water distribution
Non - Evaporable water distribution
Area of water loss
Area of water Gain
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
W_e/W_e : Weight of Evaporable water per unit weight of mix water

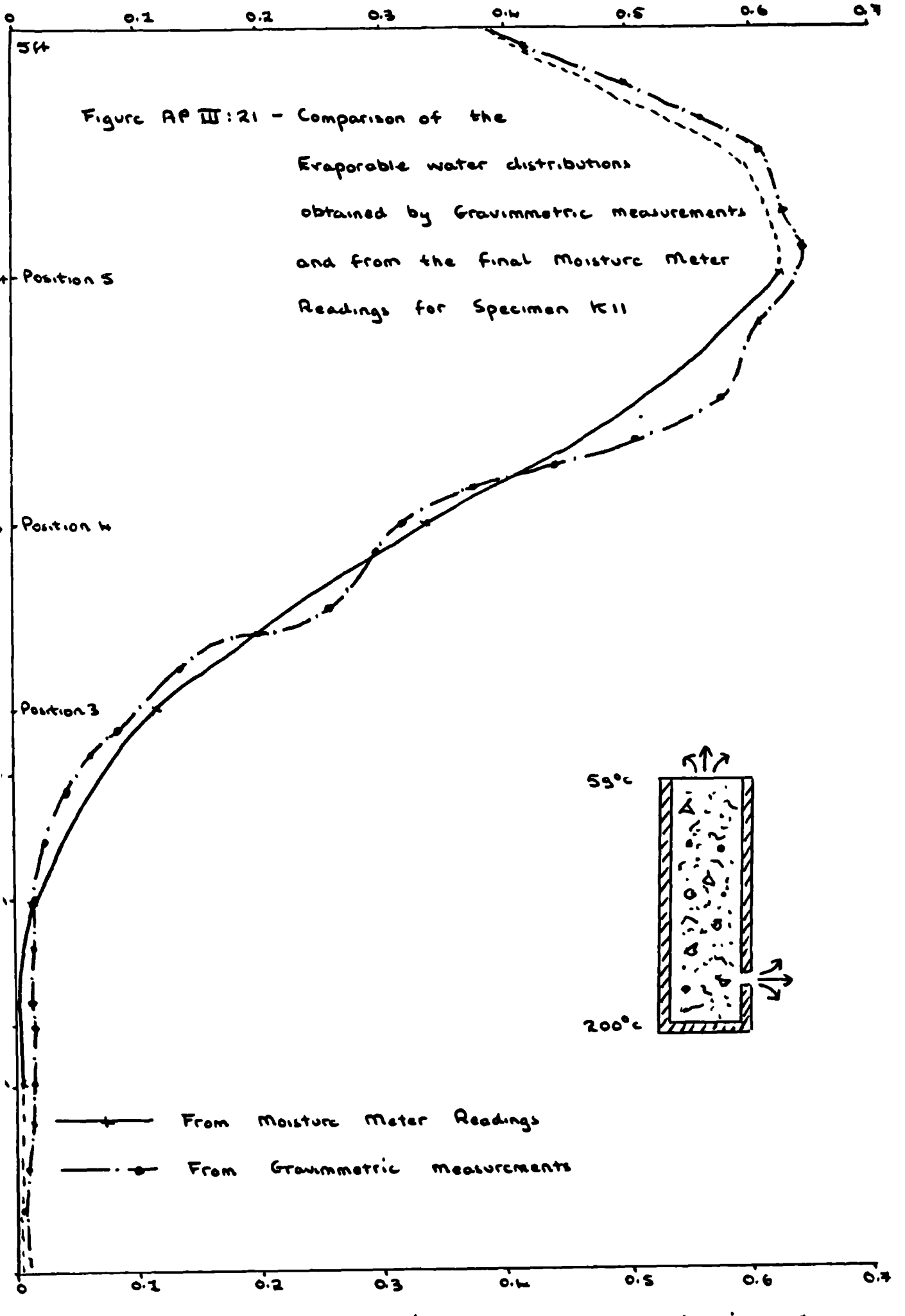


Figure AP III:21 - Comparison of the Evaporable water distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen K11

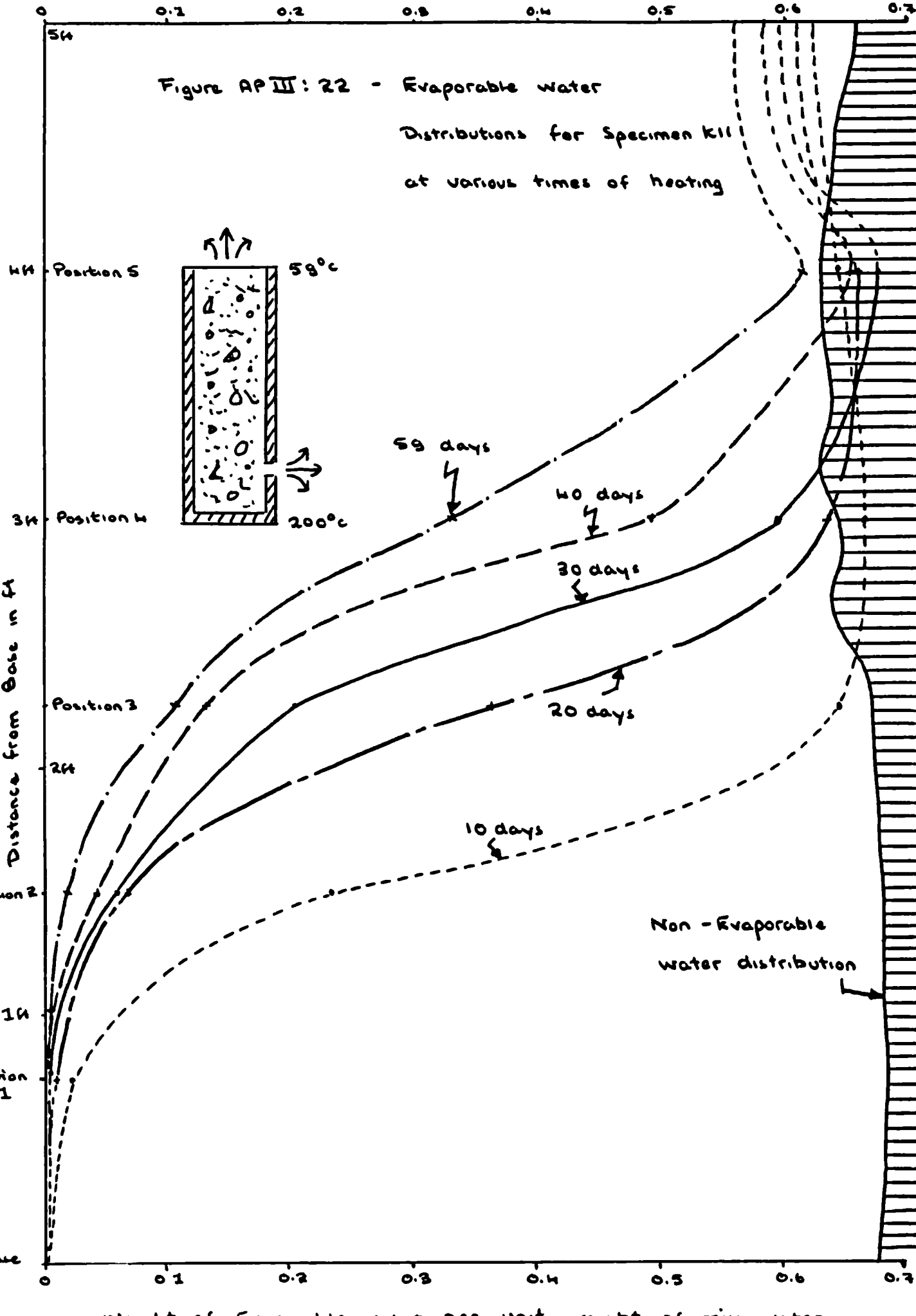


Figure AP III : 22 - Evaporable water Distributions for Specimen K11 at various times of heating

Fig AP III · 23 - Gauge Pore Pressures at the various instrumentation positions in Specimen K11 against time of heating.

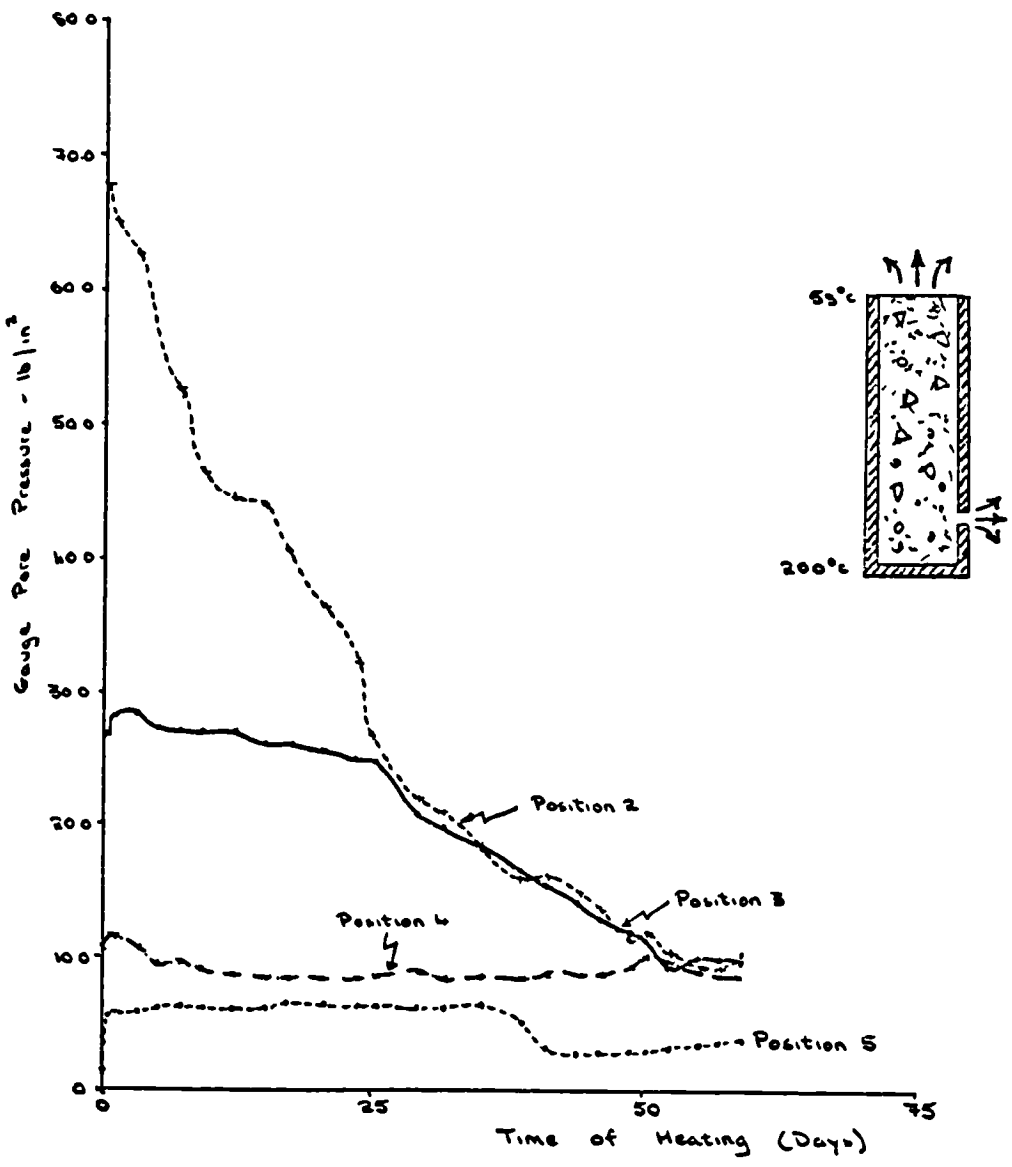


Figure APIII:24 - Gauge Pore Pressure Distributions for Specimen K11 at various times of heating.

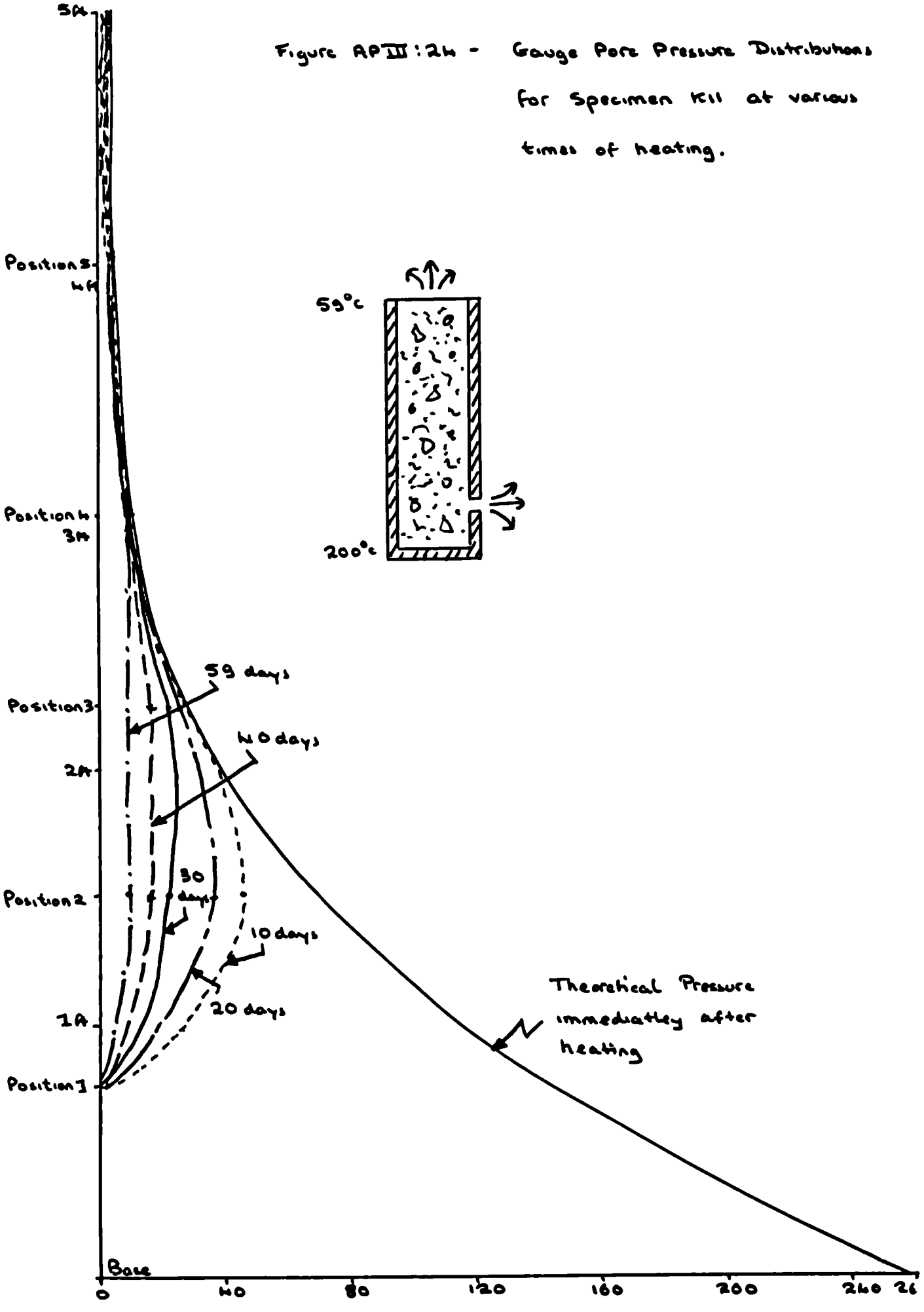
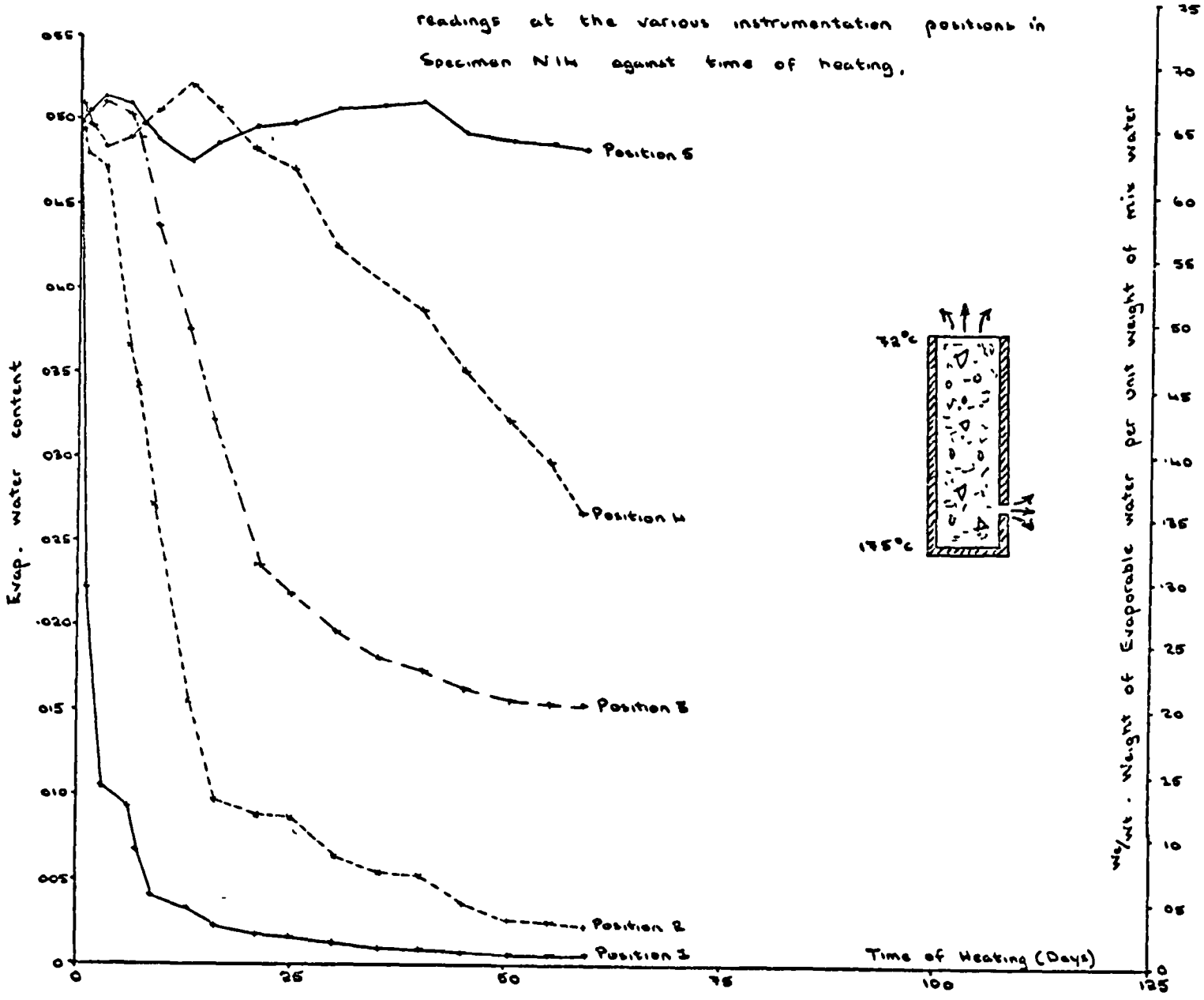


Fig AP III : 25 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen N1W against time of heating.



Average value of W_n/W_t = 0·0450

W_n/W_t : Weight of non-evaporable water per unit weight of mix water

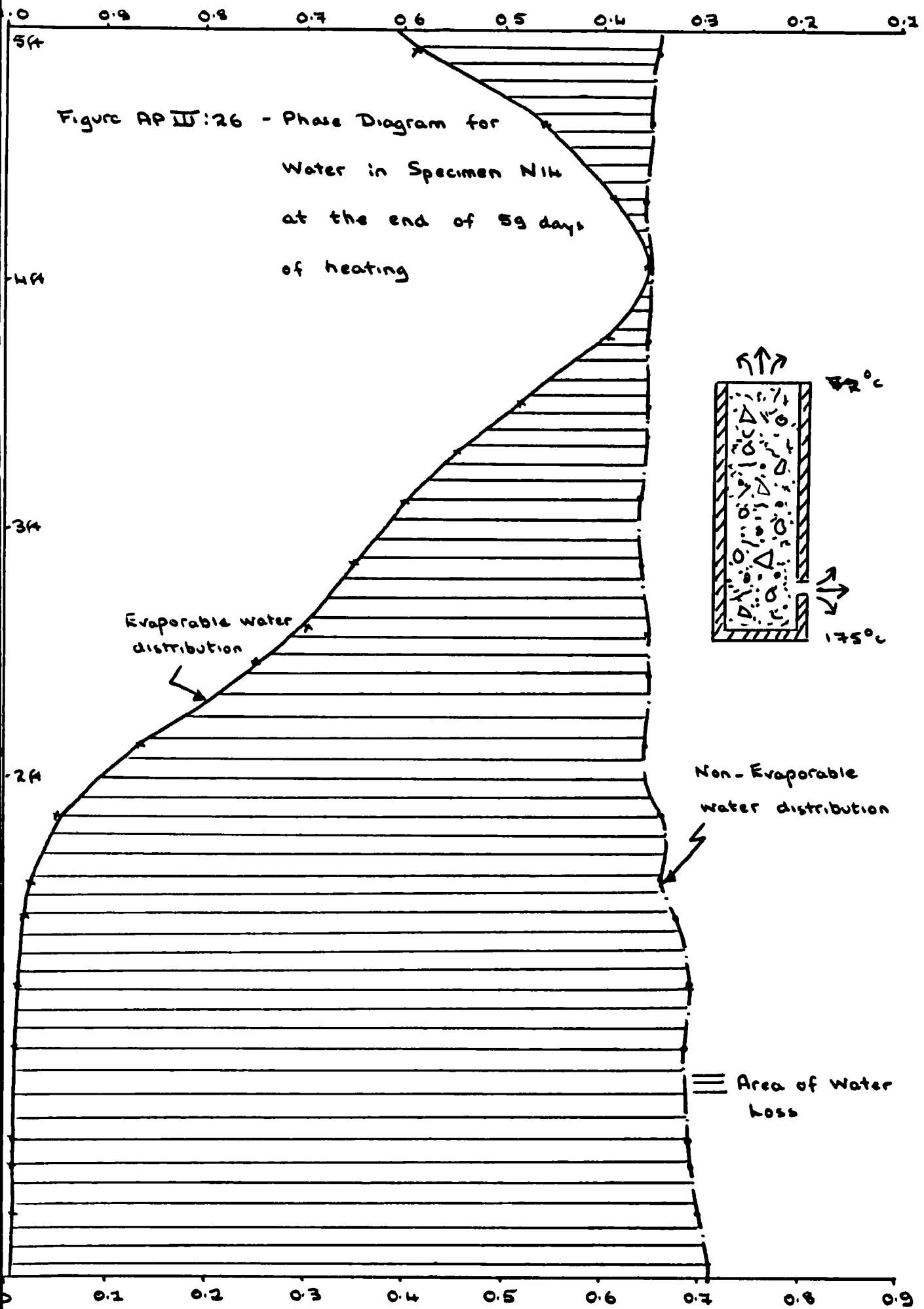


Figure AP III:26 - Phase Diagram for Water in Specimen N1H at the end of 59 days of heating

W_e/W_t : Weight of Evaporable water per unit weight of mix water

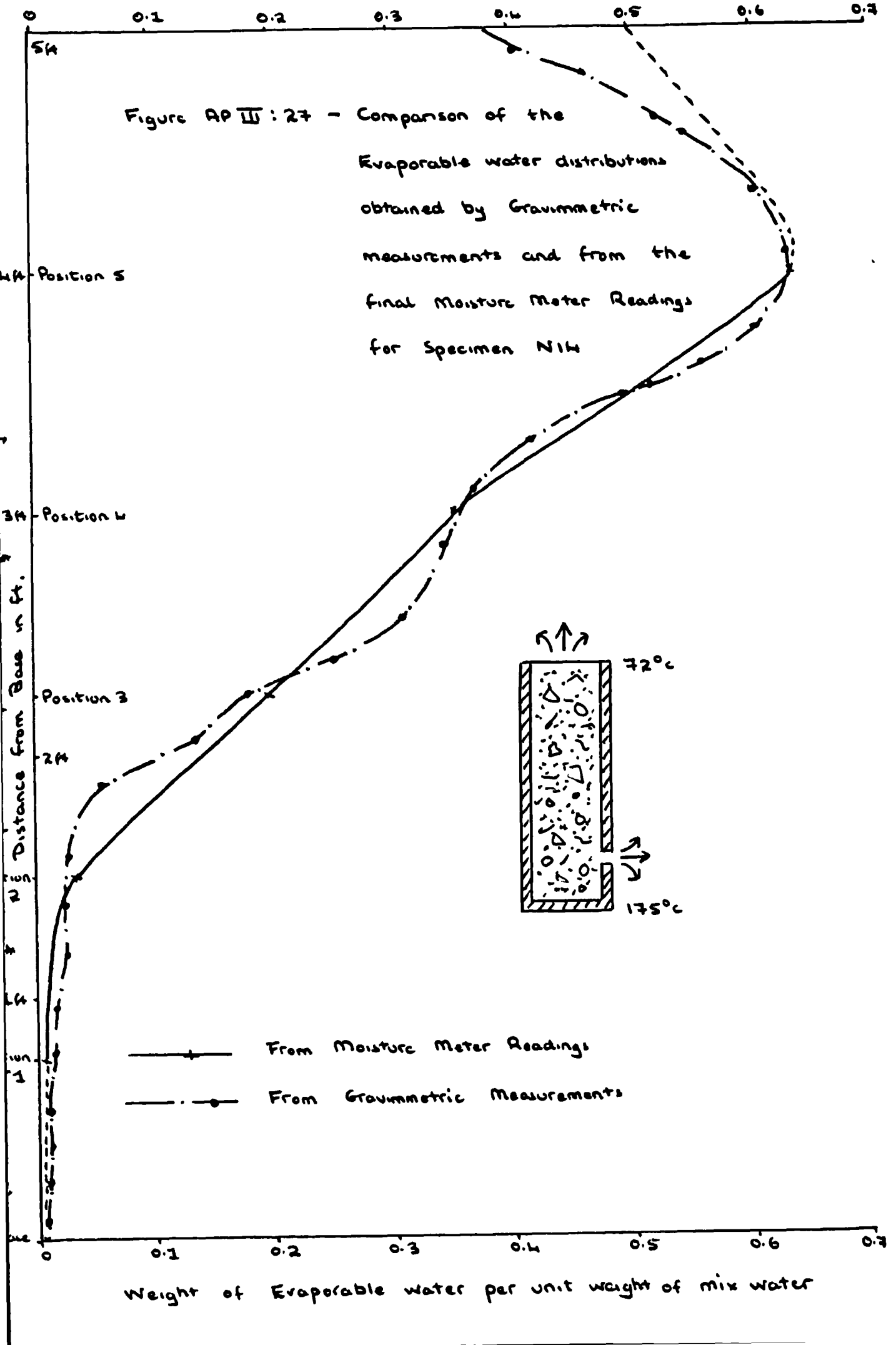


Figure AP III : 27 - Comparison of the Evaporable water distributions obtained by Gravimetric measurements and from the final Moisture Meter Readings for Specimen N1H

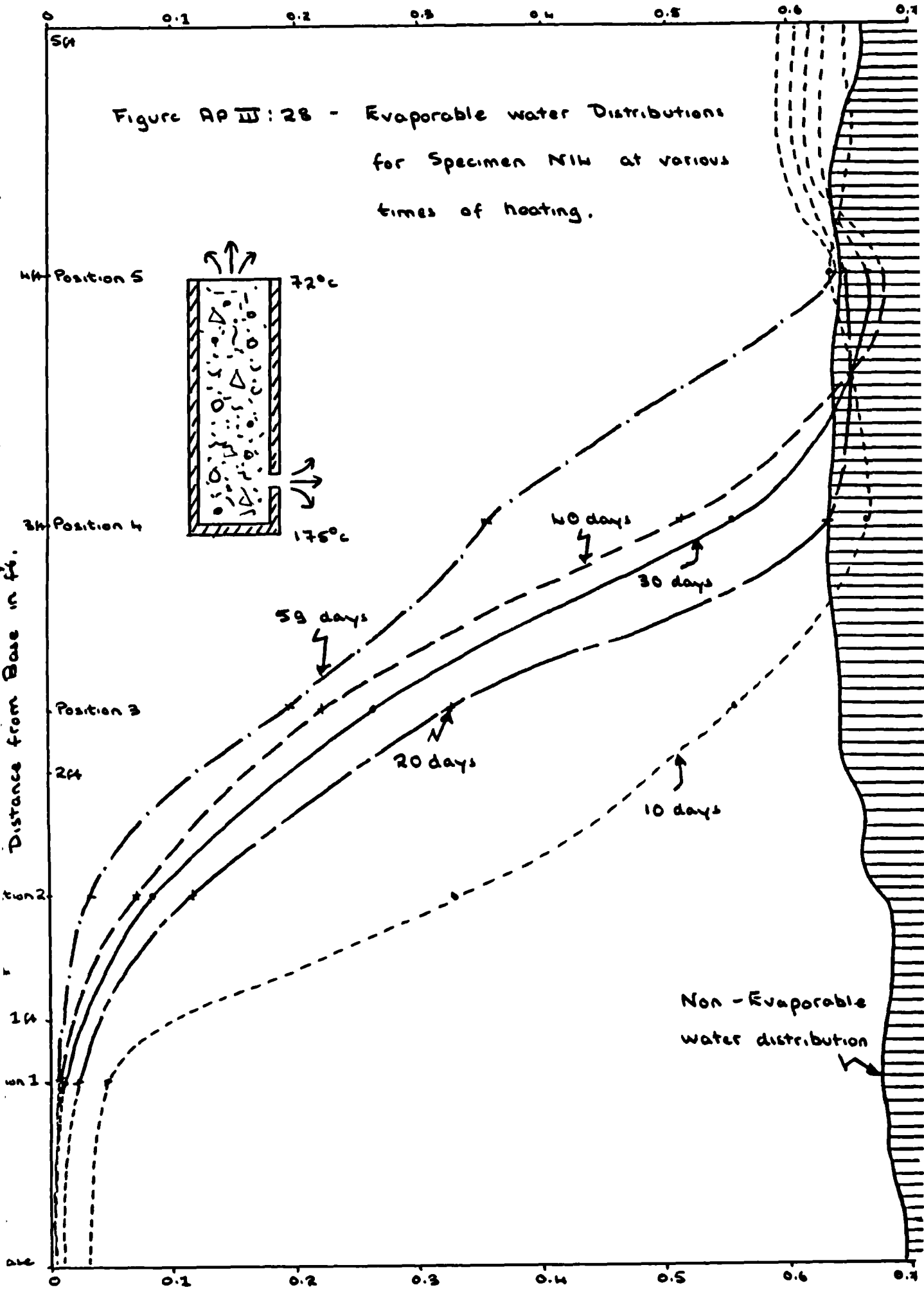


Figure AP III : 28 - Evaporable water Distributions for Specimen N1W at various times of heating.

Fig AP III : 29 - Gauge Pore Pressures at the various instrumentation positions in Specimen N14 against time of heating.

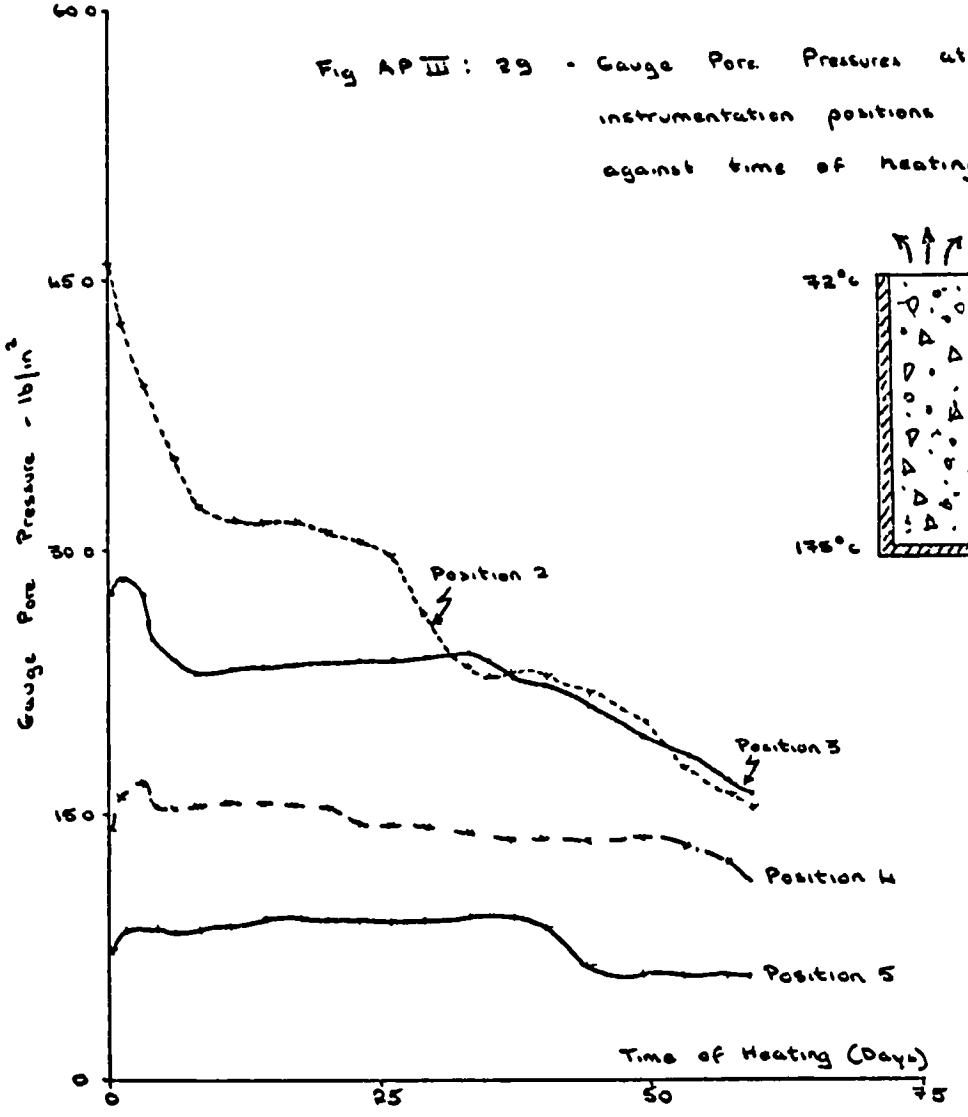


Figure APIII : 30 - Gauge Pore Pressure Distributions for Specimen N1H at various times of heating

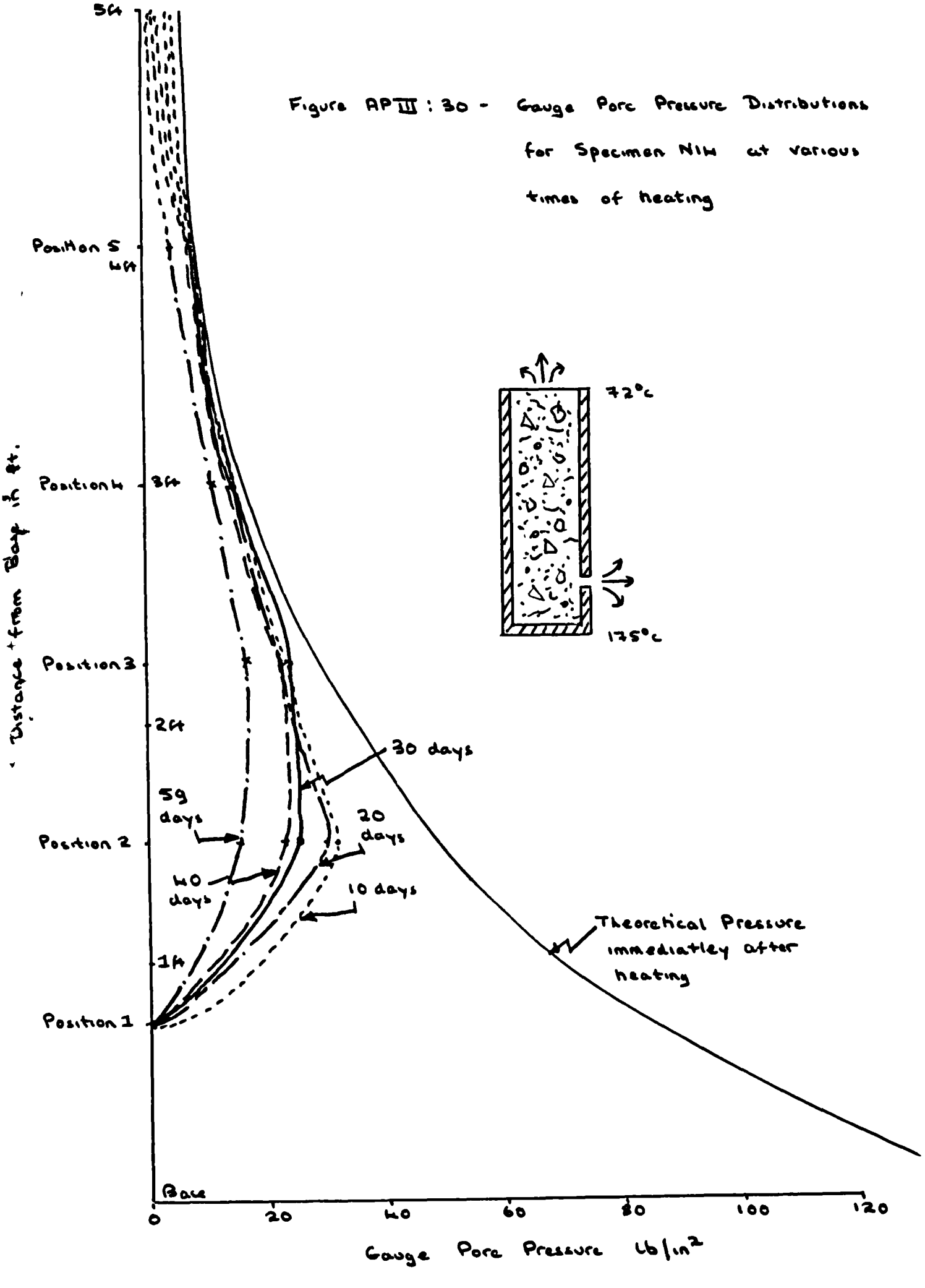
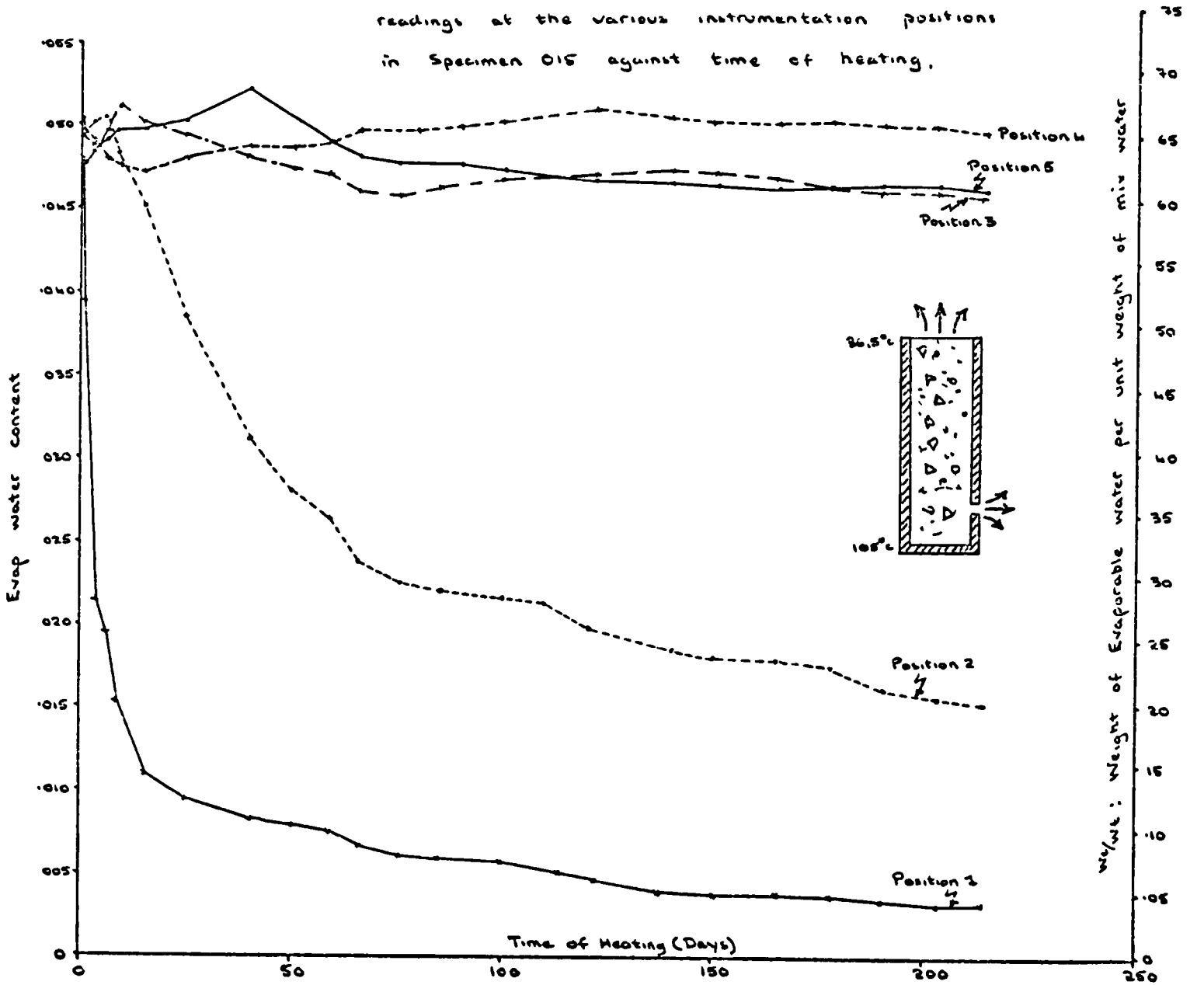


Fig AP III : 31 - Evaporable water contents from the moisture meter readings at the various instrumentation positions in Specimen 015 against time of heating.



Average value of w_n/w_t : 0·3500

w_n/w_t : Weight of non-evaporable water per unit weight of mix water

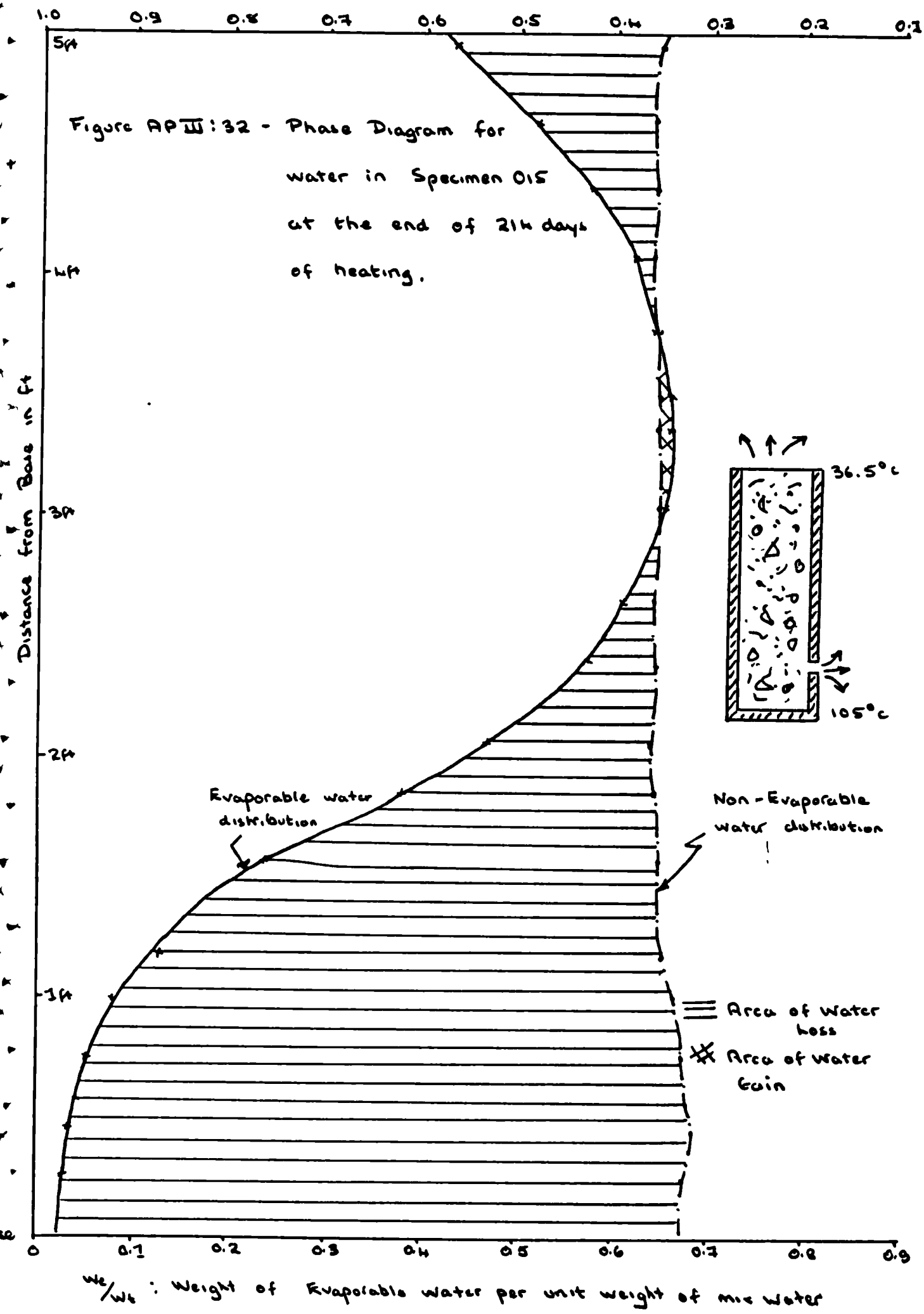


Figure AP III : 32 - Phase Diagram for water in Specimen 015 at the end of 214 days of heating.

w_e/w_t : Weight of Evaporable water per unit weight of mix water

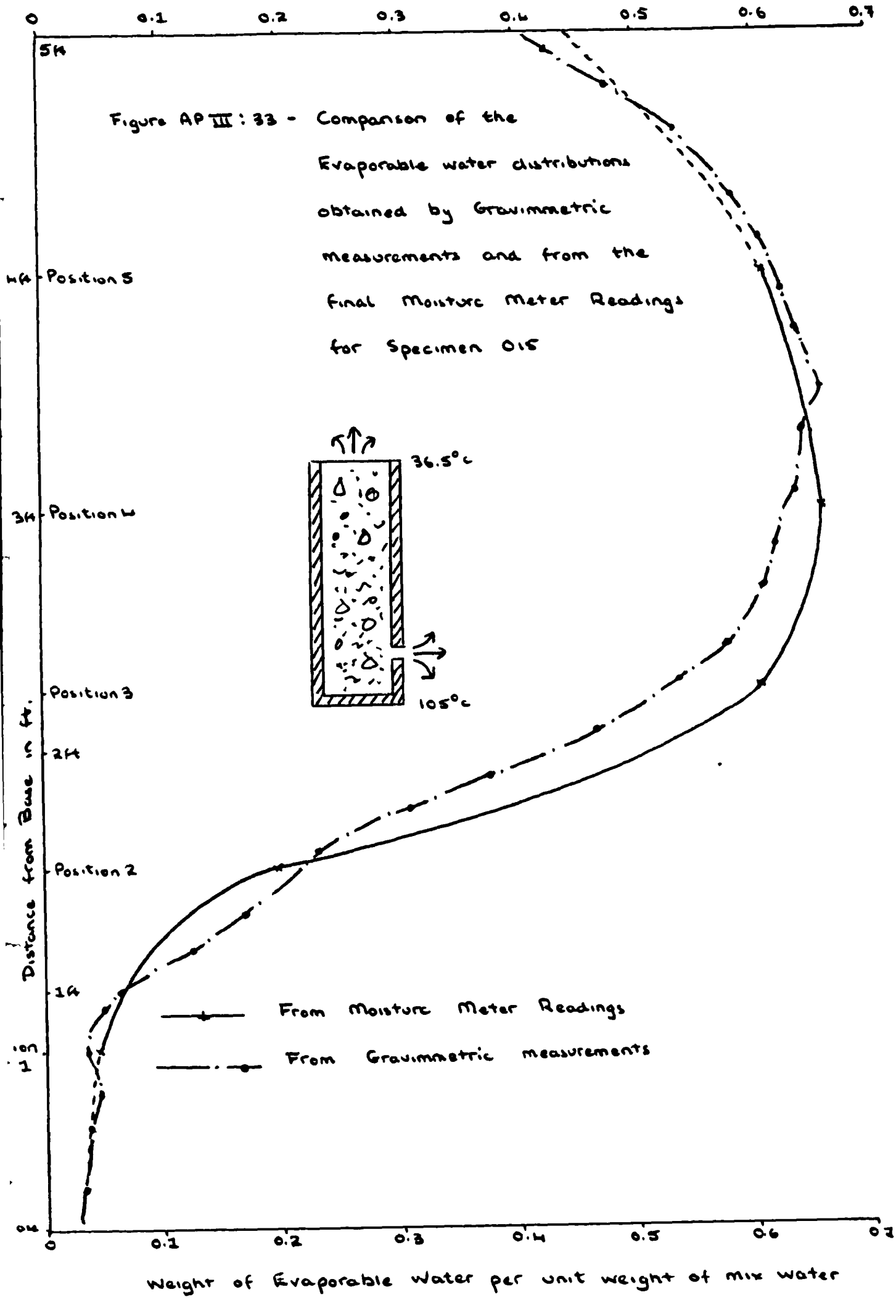


Figure AP III : 33 - Comparison of the Evaporable water distributions obtained by Gravimetric measurements and from the final Moisture Meter Readings for Specimen 015

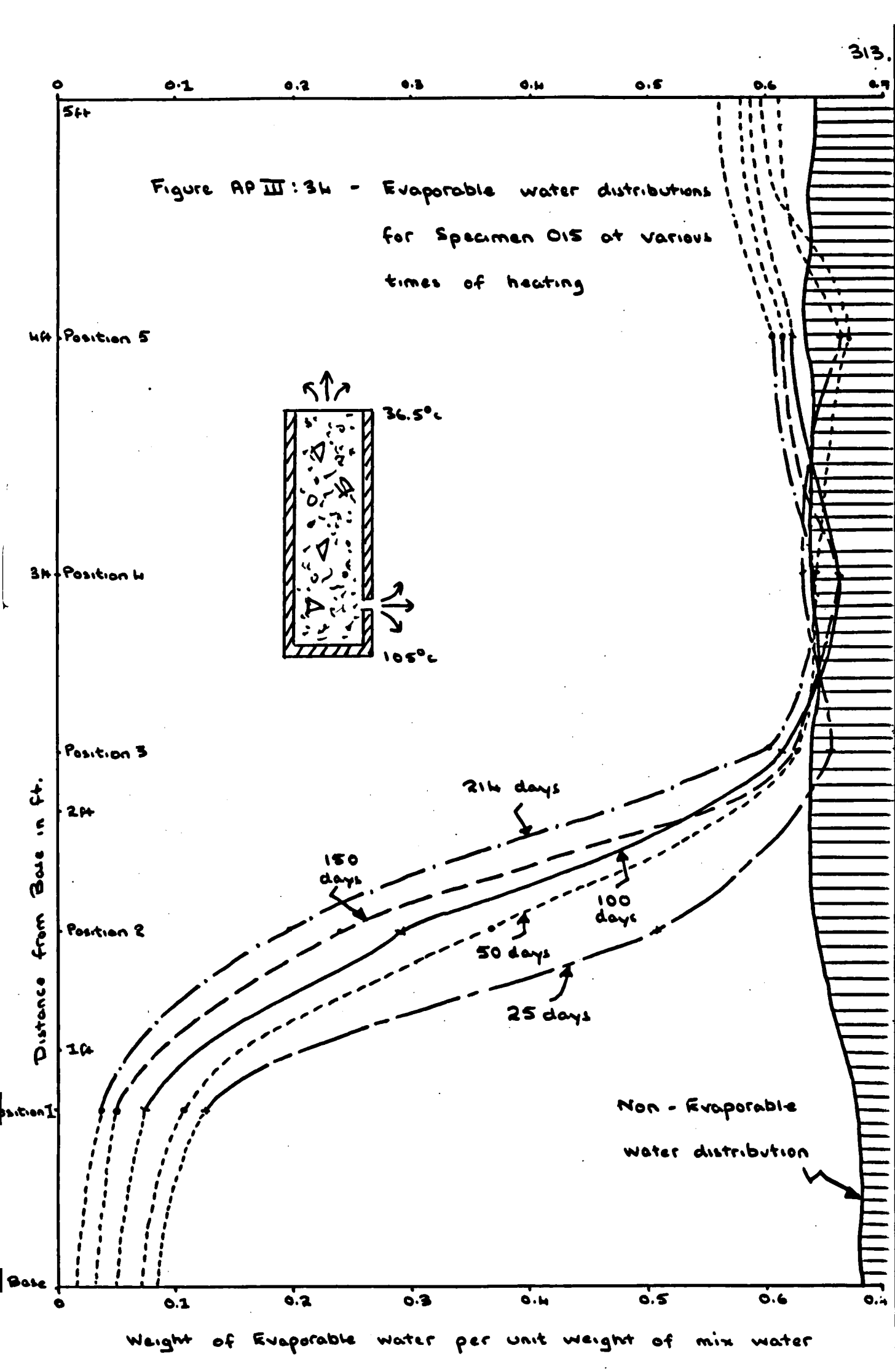
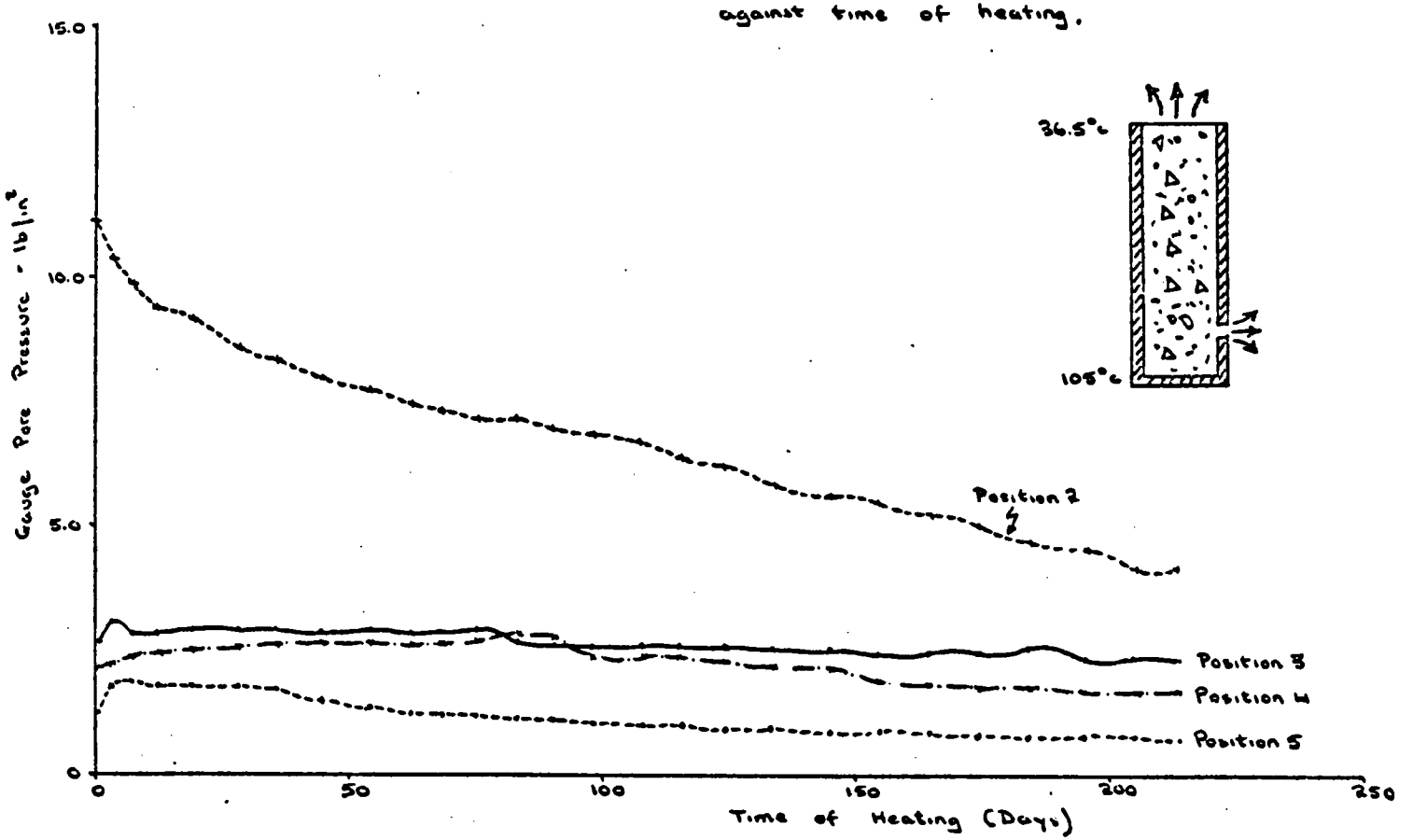


Figure AP III : 34 - Evaporable water distributions for Specimen 015 at various times of heating

Fig AP III : 35 - Gauge Pore Pressures at the various instrumentation positions in Specimen O18 against time of heating.



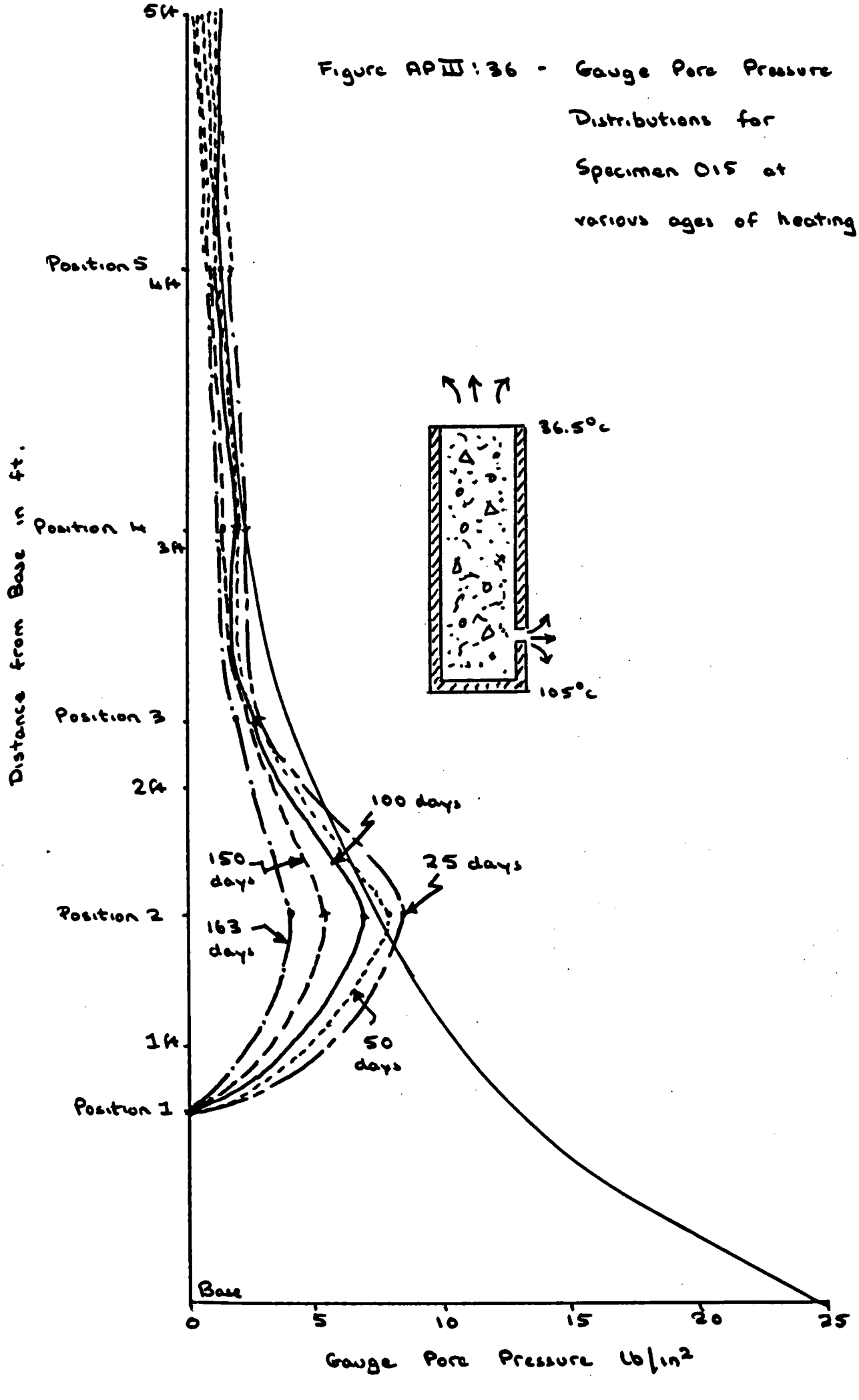


Figure AP III : 36 - Gauge Pore Pressure Distributions for Specimen 015 at various ages of heating.

CHAPTER EIGHT - PHOTOGRAPHS.

PHOTOGRAPHS FOR CHAPTER EIGHT.

Plate VIII:1 - Mix 3, Thames Ballast specimen cured at 17°C.

Plate VIII:2 - Mix 3, Thames Ballast specimen cured at 17°C.

Plate VIII:3 - Mix 3, Thames Ballast Specimen cured at 17°C.

Plate VIII:4 - Specimen CTB 1K, Thames Ballast Specimen cured at 40°C.

Plate VIII:5 - Specimen CTB 1K, Thames Ballast Specimen cured at 40°C.

Plate VIII:6 - Specimen CTB 1K, Thames Ballast Specimen cured at 40°C.

Plate VIII:7 - Specimen CTB 1M, Thames Ballast Specimen cured at 60°C.

Plate VIII:8 - Specimen CTB 1L, Thames Ballast specimen cured at 60°C.

Plate VIII:9 - Mix 7, Limestone specimen cured at 17°C.

Plate VIII:10 - Mix 7, Limestone specimen cured at 17°C.

Plate VIII:11 - Mix 7, Limestone specimen cured at 17°C.

Plate VIII:12 - Mix 6, Limestone specimen cured at 17°C.

Plate VIII:13 - Mix 6, Limestone specimen cured at 17°C.

Plate VIII:14 - Mix 6, Limestone specimen cured at 17°C.

Plate VIII:15 - Mix 6, Limestone specimen cured at 17°C.

Plate VIII:16 - Specimen CL 1M, Limestone specimen cured at 40°C.

Plate VIII:17 - Specimen CL 1M, Limestone Specimen cured at 40°C.

Plate VIII:18 - Specimen CL 1M, Limestone Specimen cured at 40°C.

Plate VIII:19 - Specimen CL 1J, Limestone specimen cured at 60°C.

Plate VIII:20 - Specimen X2, Limestone specimen cured at 40°C.

Plate VIII:21 - Specimen X2, Limestone specimen cured at 40°C.

Plate VIII·22 - Specimen X3, Limestone specimen cured at 60°C.

Plate VIII:23 - Specimen X3, Limestone specimen cured at 60°C.

Plate VIII.24 - Specimen Y1, Limestone specimen cured at 17°C.

Plate VIII.25 - Specimen Y1, Limestone specimen cured at 17°C.

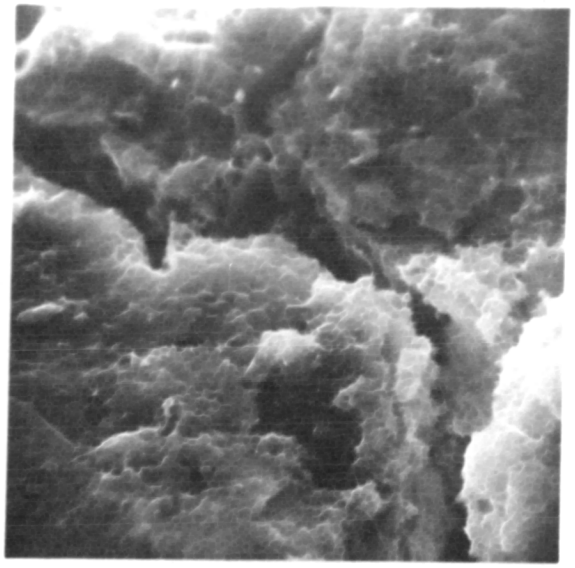
Plate VIII:26 - Specimen Y2, Limestone specimen cured at 40°C.

Plate VIII·27 - Specimen Y3, Limestone specimen cured at 60°C.

Plate VIII:28 - Specimen Y3, Limestone specimen cured at 60°C.

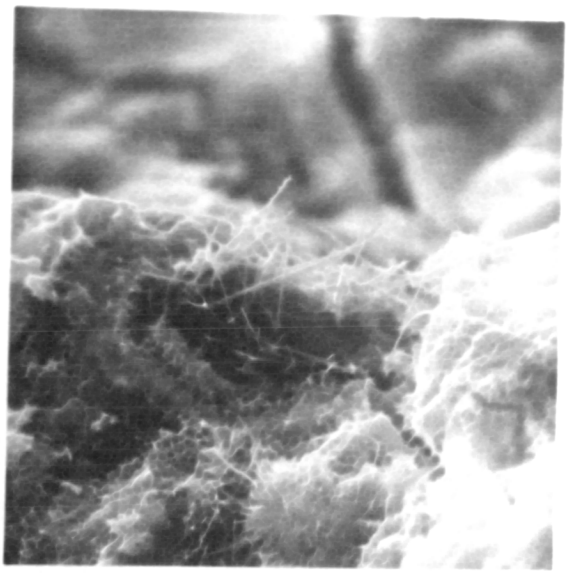
HYDRATION TESTS.

PLATE VIII : 1.



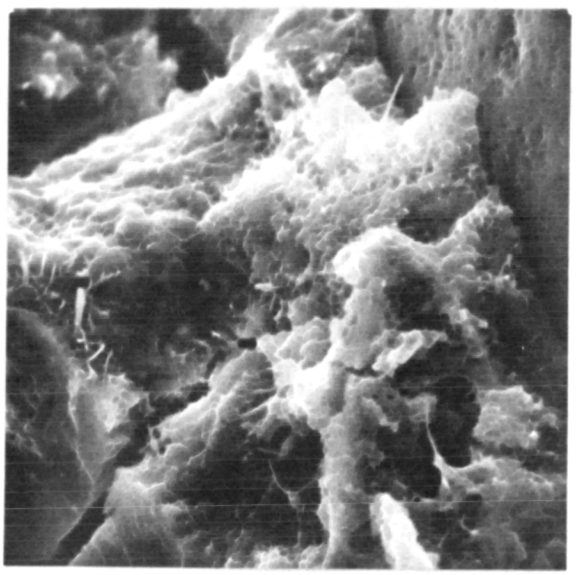
Magnification 2.48K 5μm

PLATE VIII : 2.



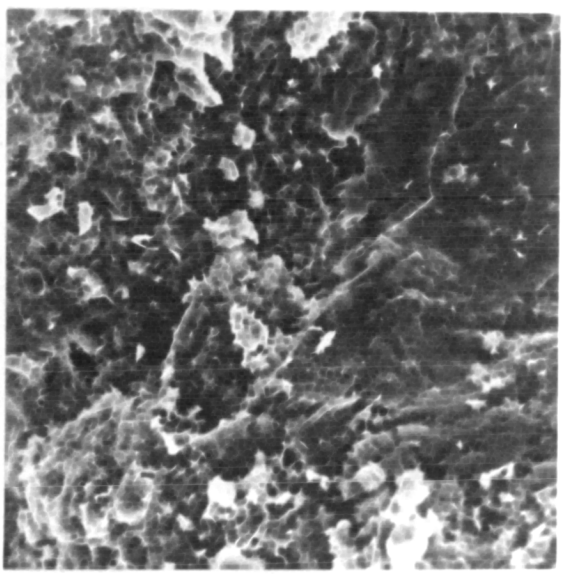
Magnification 2.15K 5μm

PLATE VIII : 3.



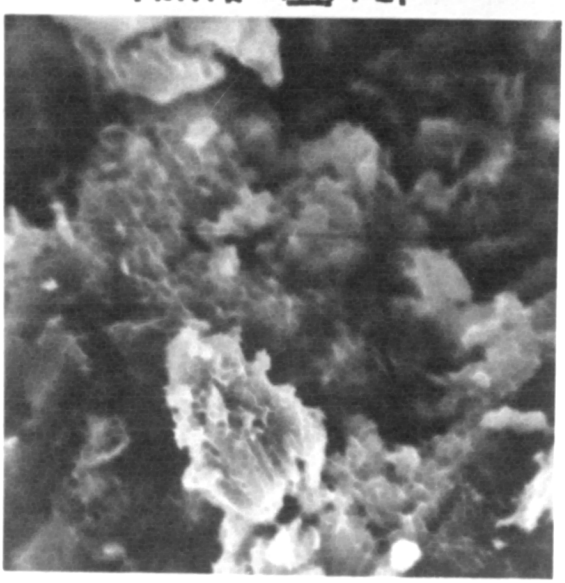
Magnification 1.93K 5μm

PLATE VIII : 4.



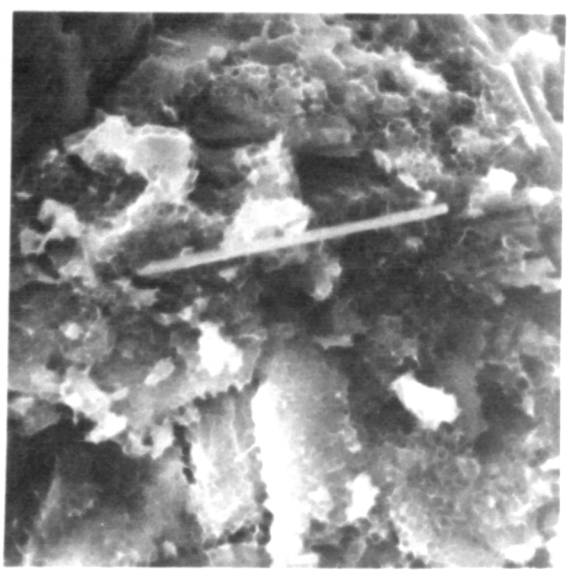
Magnification 473K 10μm

PLATE VIII : 5.



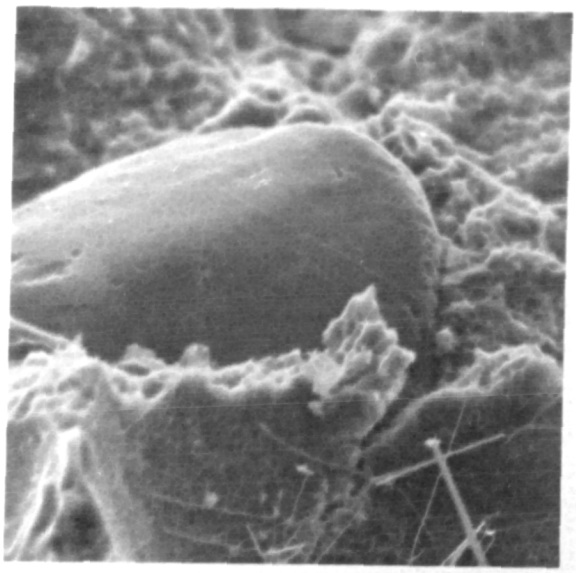
Magnification 1.91K 5μm

PLATE VIII : 6.



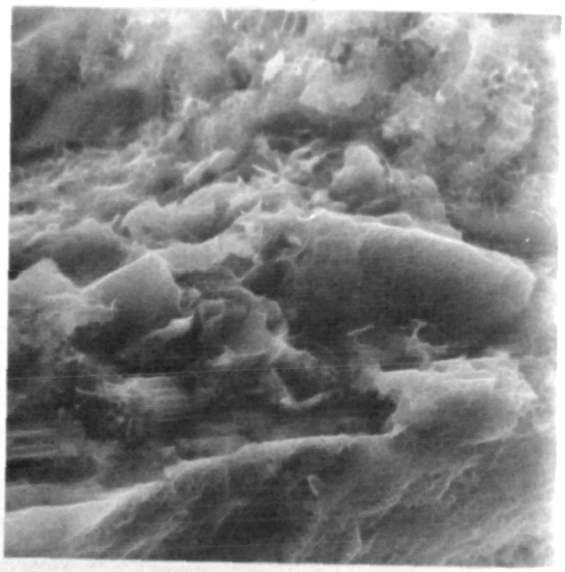
Magnification 1.91K 5μm

PLATE VIII : 7.



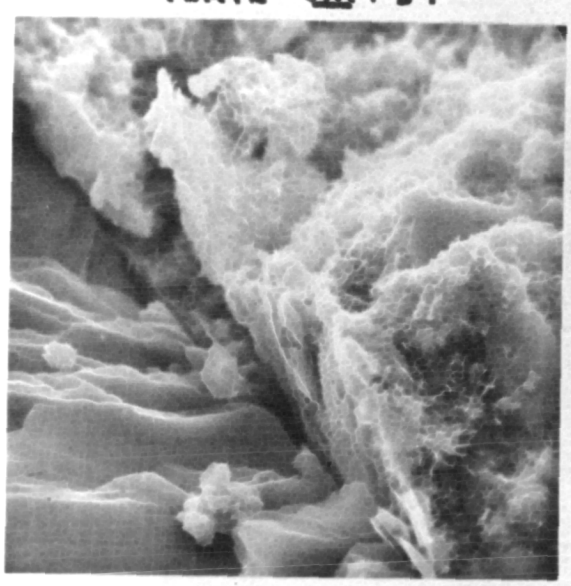
Magnification 4.93K 10μm

PLATE VIII : 8.



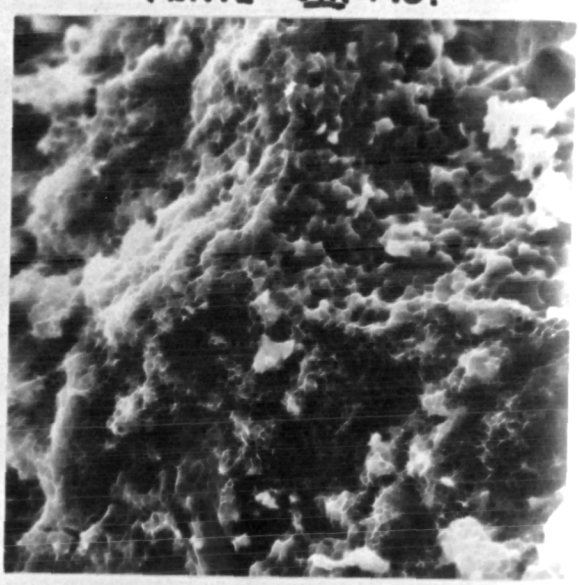
Magnification 1.98K 5μm

PLATE VIII : 9.



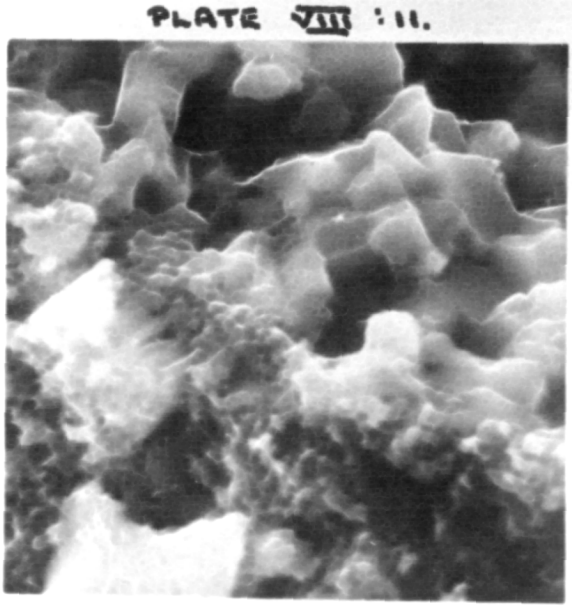
Magnification 1.81K 5μm

PLATE VIII : 10.



Magnification 1.16K 10μm

PLATE VIII : 11.



Magnification 5.76K 1μm

PLATE VIII : 12.

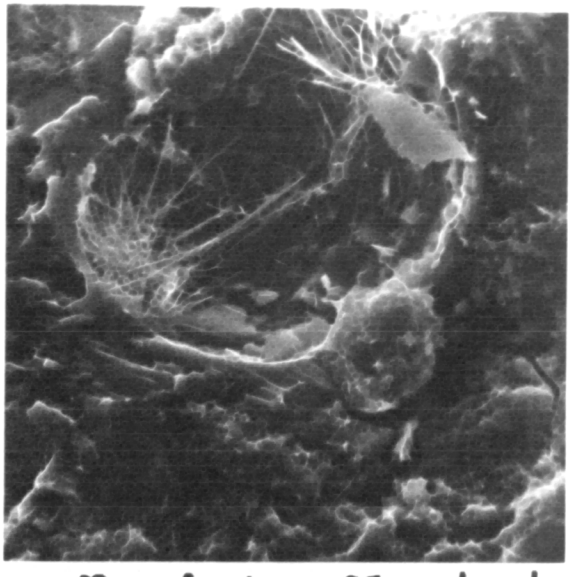
Magnification 1.94K 5μm

HYDRATION TESTS

PLATE VIII : 13.

Magnification 1.03K 10μm

PLATE VIII : 14.

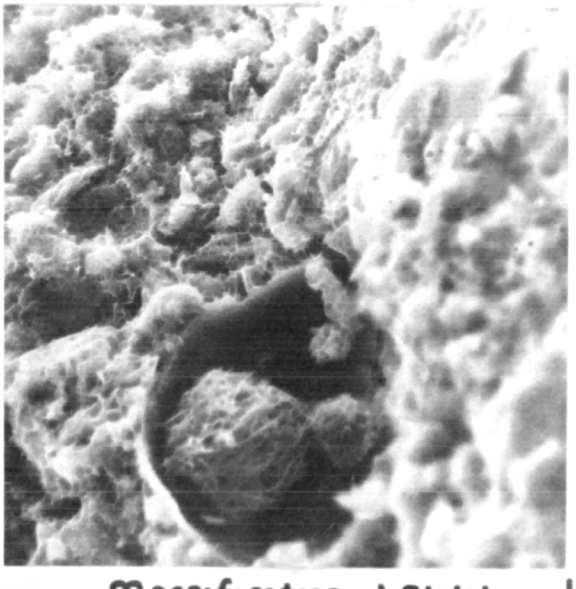


Magnification 97K × 10μm

PLATE VIII : 15.

Magnification 1.91K 5μm

PLATE VIII : 16.

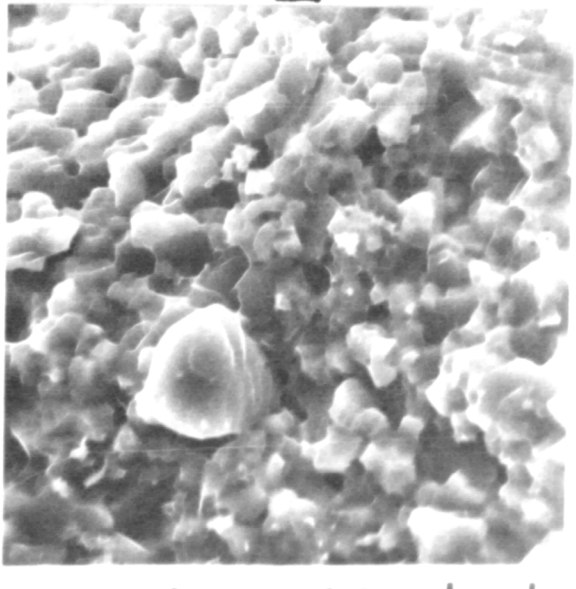


Magnification 1.04K 10μm

PLATE VIII : 17.

Magnification 1.10K 10μm

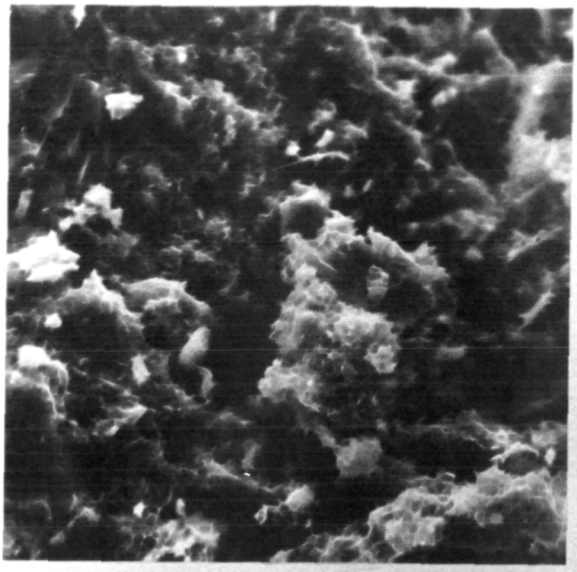
PLATE VIII : 18.



Magnification 2.20K 5μm

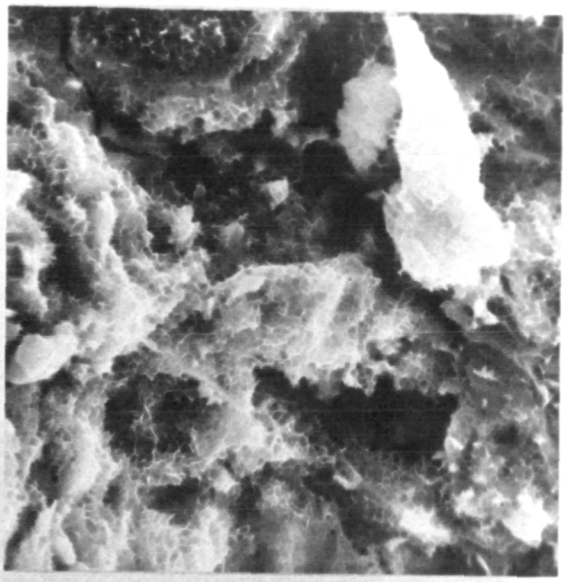
HYDRATION TESTS.

PLATE VIII : 19.



Magnification 1.04K 10μm

PLATE VIII : 20.

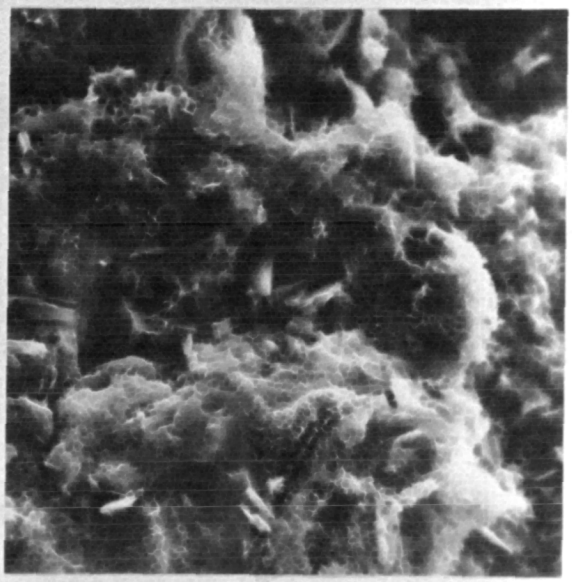


Magnification 1.97K 5μm

PLATE VIII : 21.

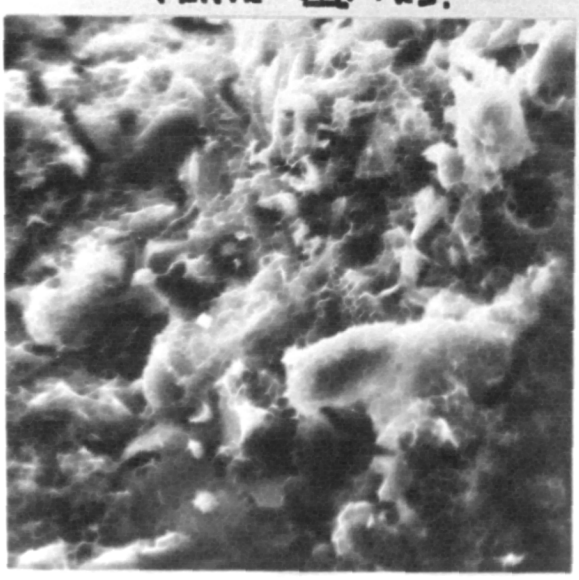
Magnification 2.09K 5μm

PLATE VIII : 22.



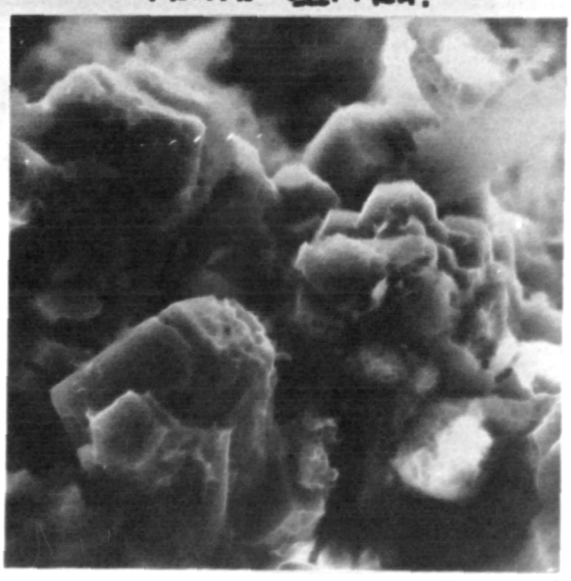
Magnification 1.25K 10μm

PLATE VIII : 23.



Magnification 1.21K 10μm

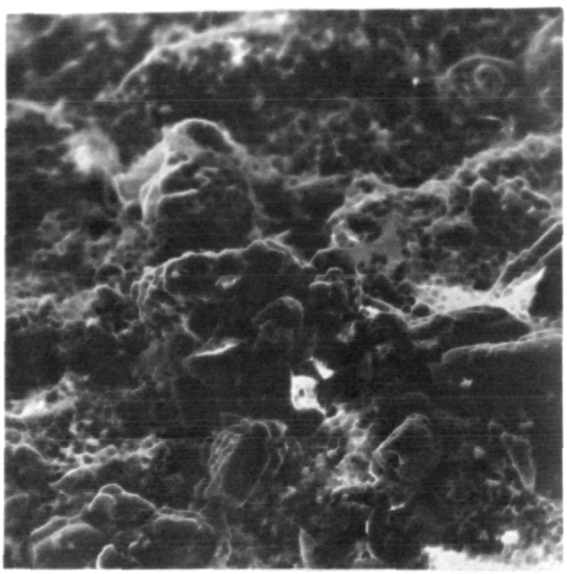
PLATE VIII : 24.



Magnification 1.83K 7μm

HYDRATION TESTS.

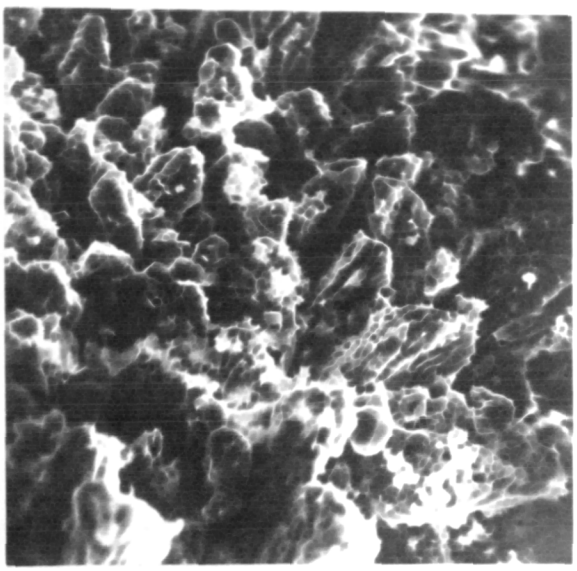
PLATE VIII : 25.



Magnification 469 x

10μm

PLATE VIII : 26.



Magnification 611 x

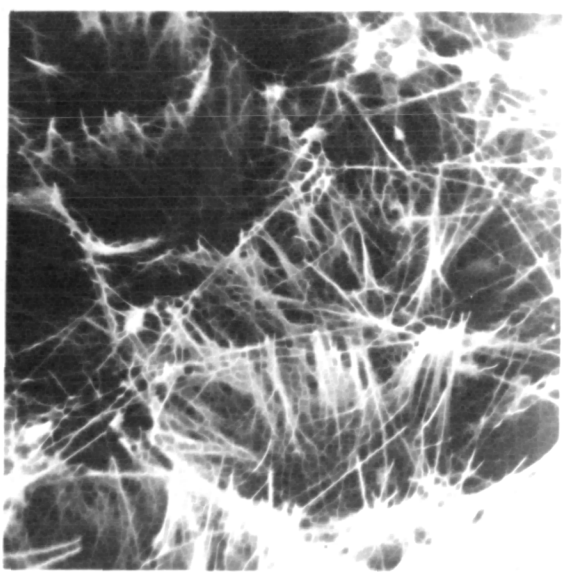
10μm

PLATE VIII : 27.

Magnification 2.24k

5μm

PLATE VIII : 28.



Magnification 552 x

10μm

CHAPTER NINE AND APPENDIX IV - FIGURES.

FIGURES FOR CHAPTER NINE.

Figure 9:1 - Temperature distributions for the Pore pressure/Shrinkage specimen and Specimen I.9 run in conjunction with it.

Figure 9:2 - Temperature Gradient applied to Specimen used to determine the variation of the linear coefficient of Thermal Expansion with Evaporable water content.

Figure 9·3 - Variation of Linear Coefficient of Thermal Expansion with Evaporable water content for the Limestone Concrete used in Pore Pressure/Shrinkage Specimen.

Figure 9:4 - Graph of Weight Loss against time of heating for specimen I.9.

Figure 9:5 - Evaporable water contents from moisture meter readings at the various instrumentation positions against time of heating for Specimen I.9.

Figure 9·6 - Gauge Pore Pressure measured at the various instrumentation positions against time of heating for Specimen I.9.

Figure 9:7 - Phase Diagram for water in Specimen I.9 at the end of the time of heating of 294 days.

Figure 9·8 - Evaporable water contents from Moisture Meter Readings in Slices 1-10 against time of heating for Pore Pressure/ Shrinkage specimen.

Figure 9:9 - Evaporable water contents from Moisture Meter readings in Slices 11-20 against time of heating for Pore Pressure/ Shrinkage specimen.

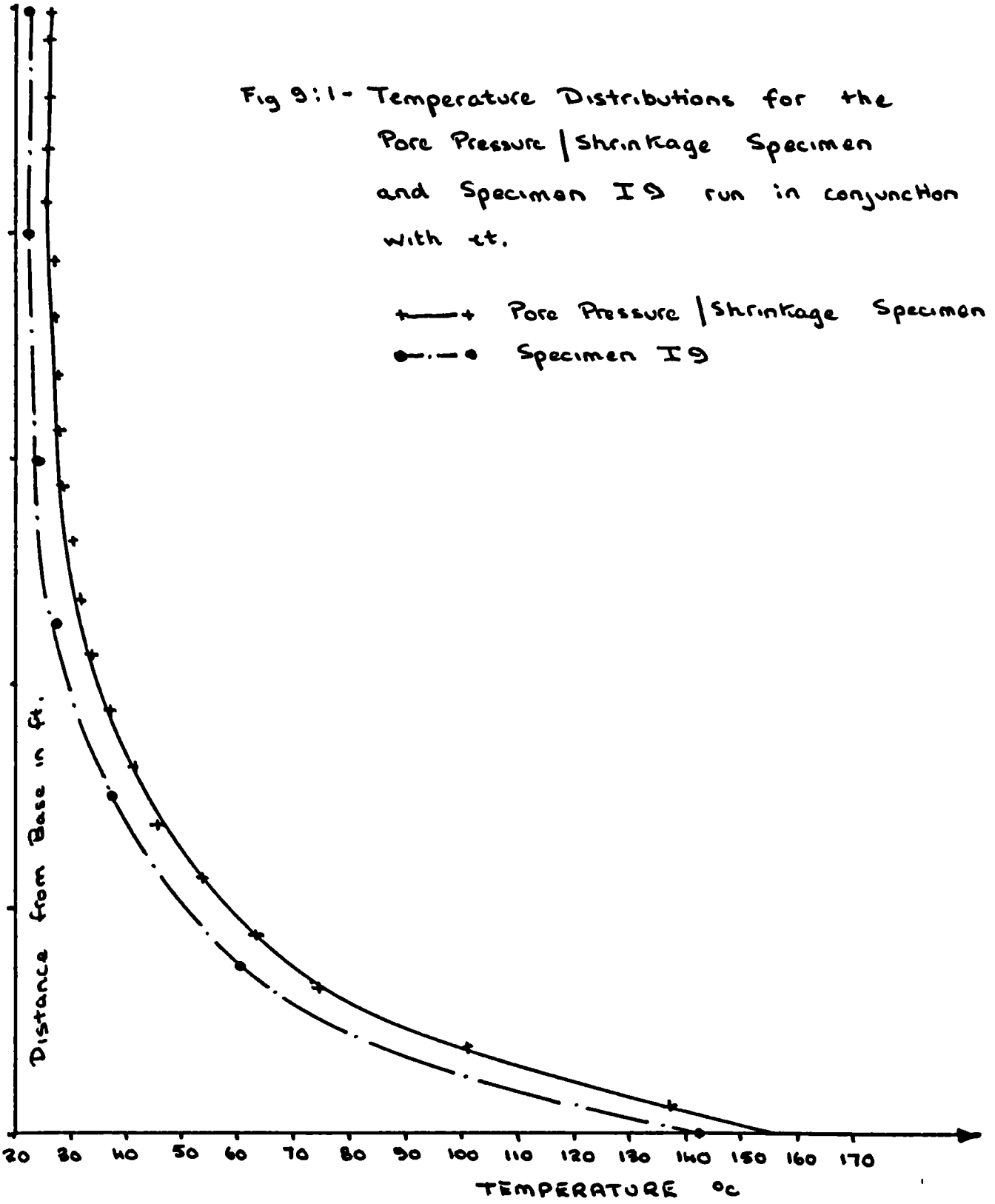
Figure 9:10 - Gauge Pore Pressure measured in various slices against time of heating for Pore Pressure/Shrinkage specimen.

Figure 9:11 - Transverse Shrinkage in even numbered slices against time of heating for Pore Pressure/Shrinkage specimen.

Figure 9:12 - Transverse Shrinkage in odd numbered slices against time of heating for Pore Pressure/Shrinkage specimen.

Figure 9·13 - Longitudinal shrinkage in even numbered slices against time of heating for Pore Pressure/Shrinkage specimen.

Fig 9:1 - Temperature Distributions for the Pore Pressure / Shrinkage Specimen and Specimen I9 run in conjunction with it.



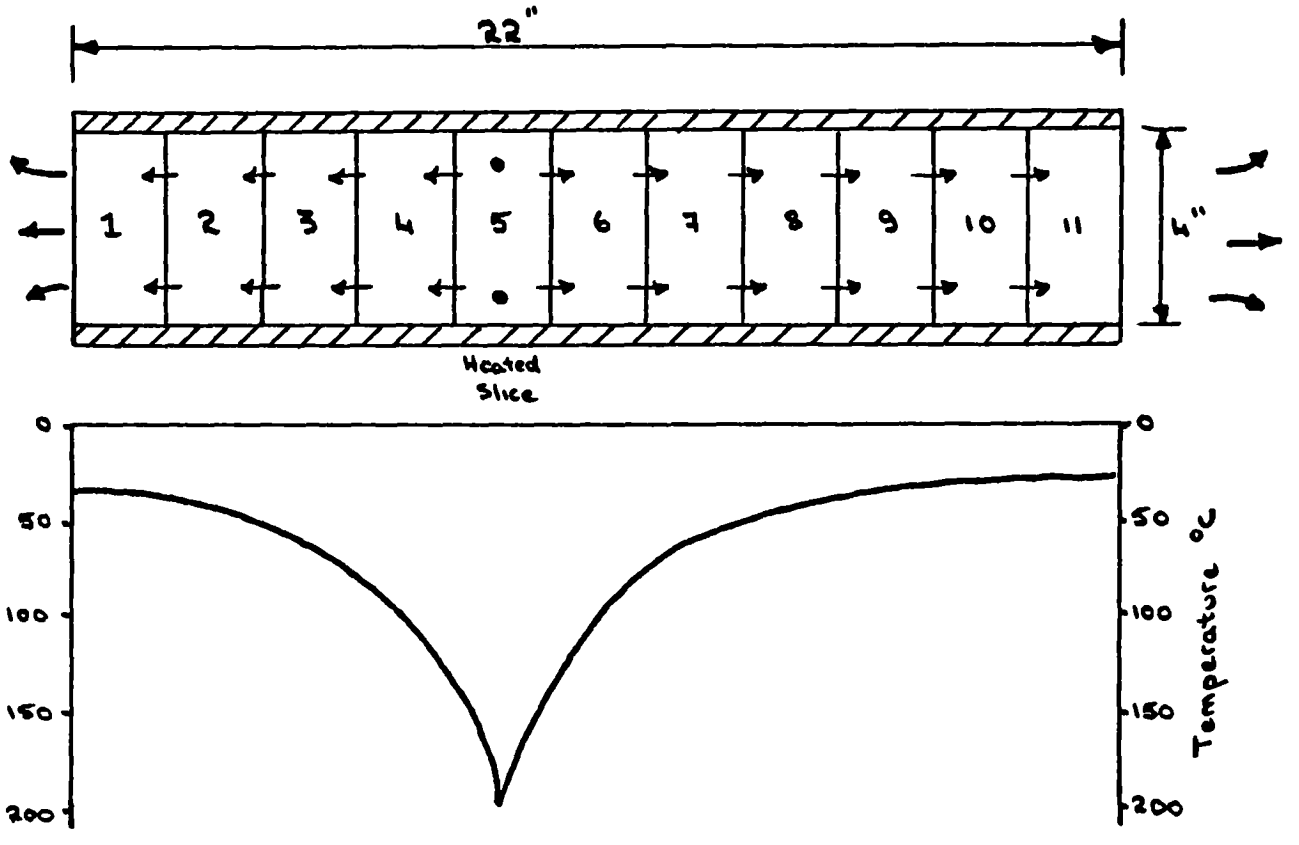


Fig 9:2 - Temperature Gradient applied to Specimen used to determine the variation of the linear Coefficient of Thermal Expansion with Evaporable water content.

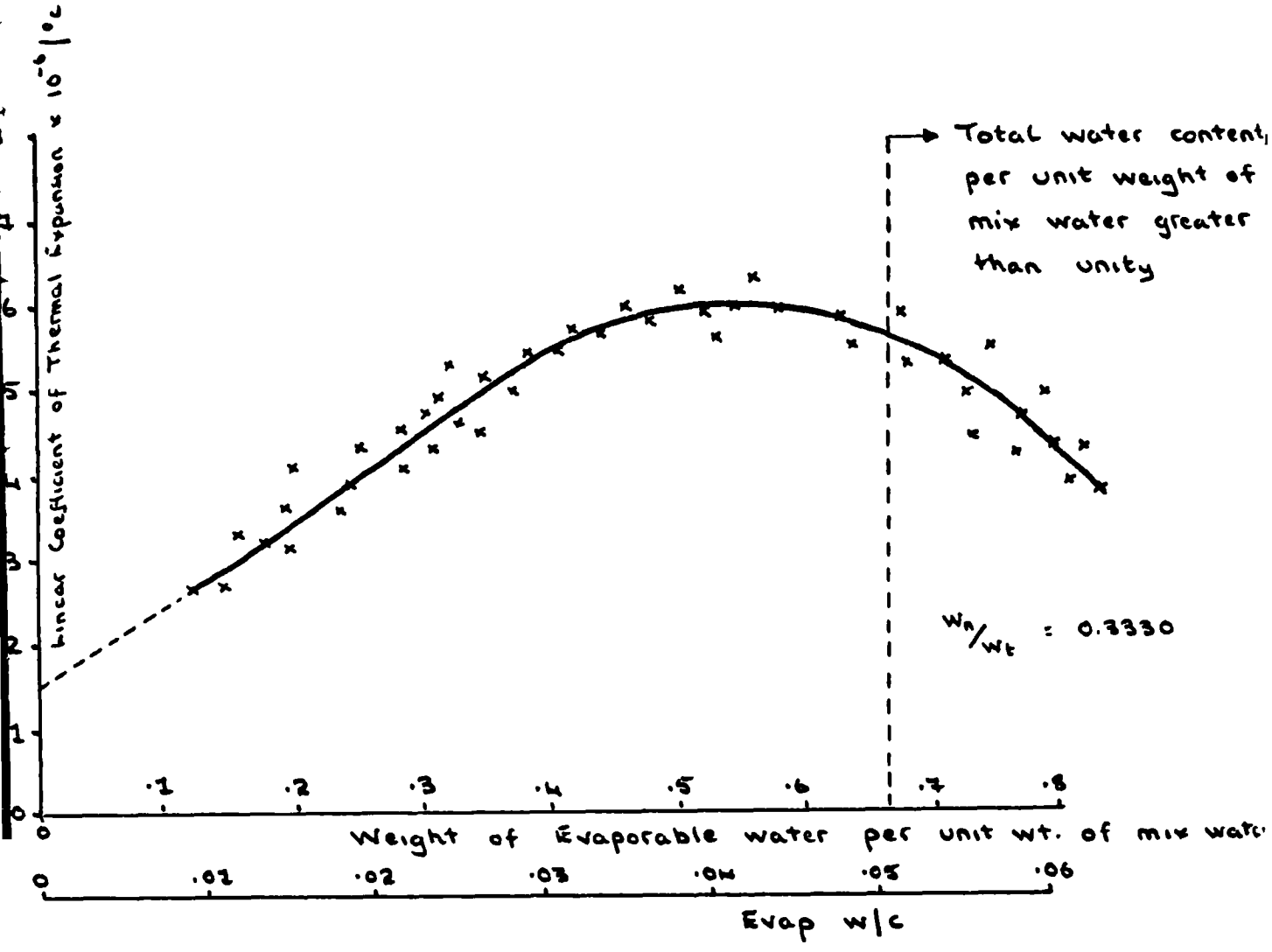
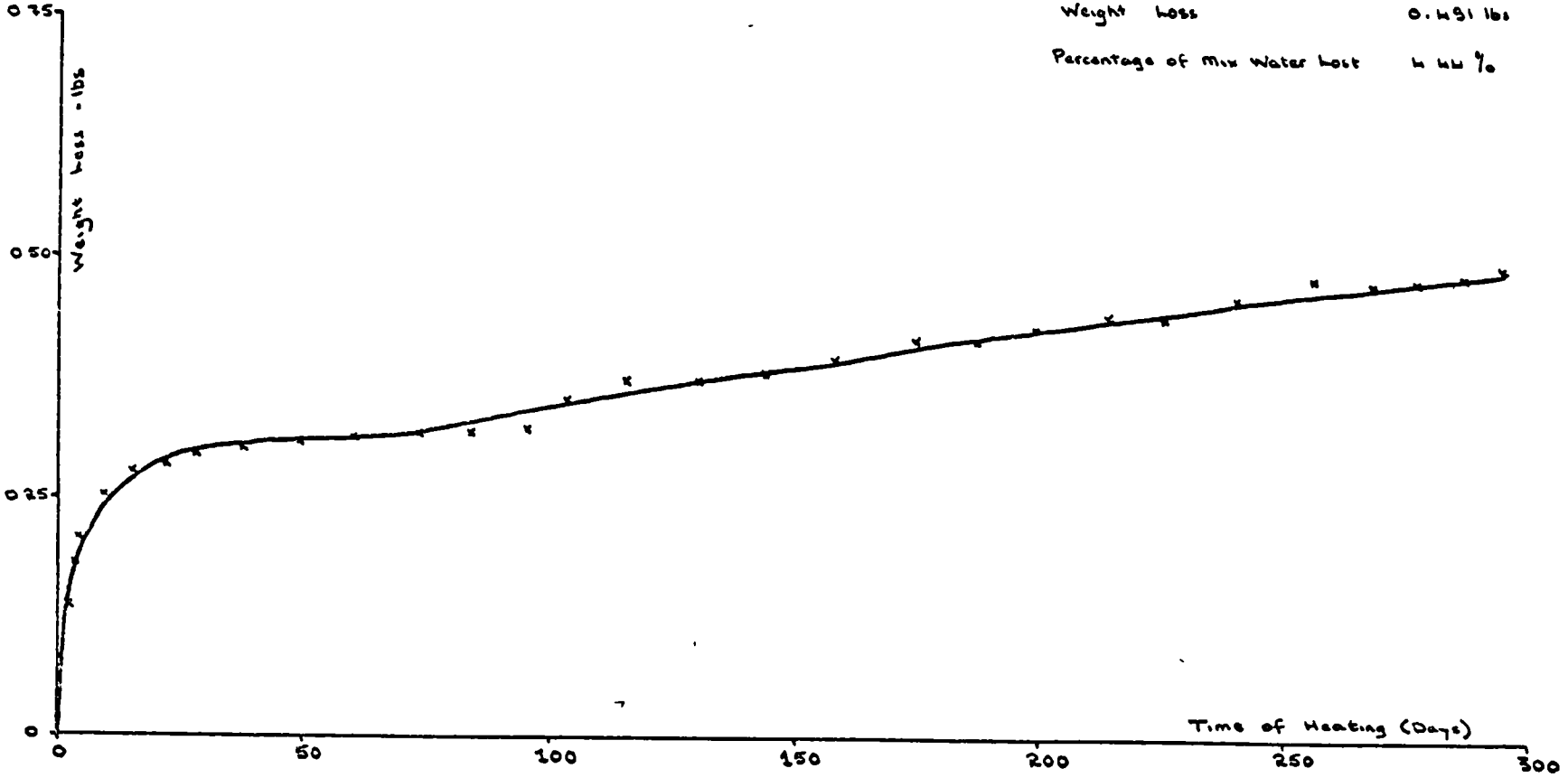
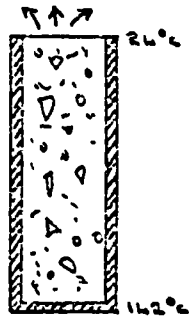


Fig 9:3 - Variation of Linear Coefficient of Thermal Expansion with Evaporable water content for the Limestone Concrete used in the Pore Pressure/Shrinkage Specimen.

Fig 9·4 - Graph of weight loss against time of heating for Specimen I9.

Total Weight of Concrete	146 77 lbs
Weight of mix Water	11 05 lbs
Weight loss	0.491 lbs
Percentage of mix water lost	4 44 %





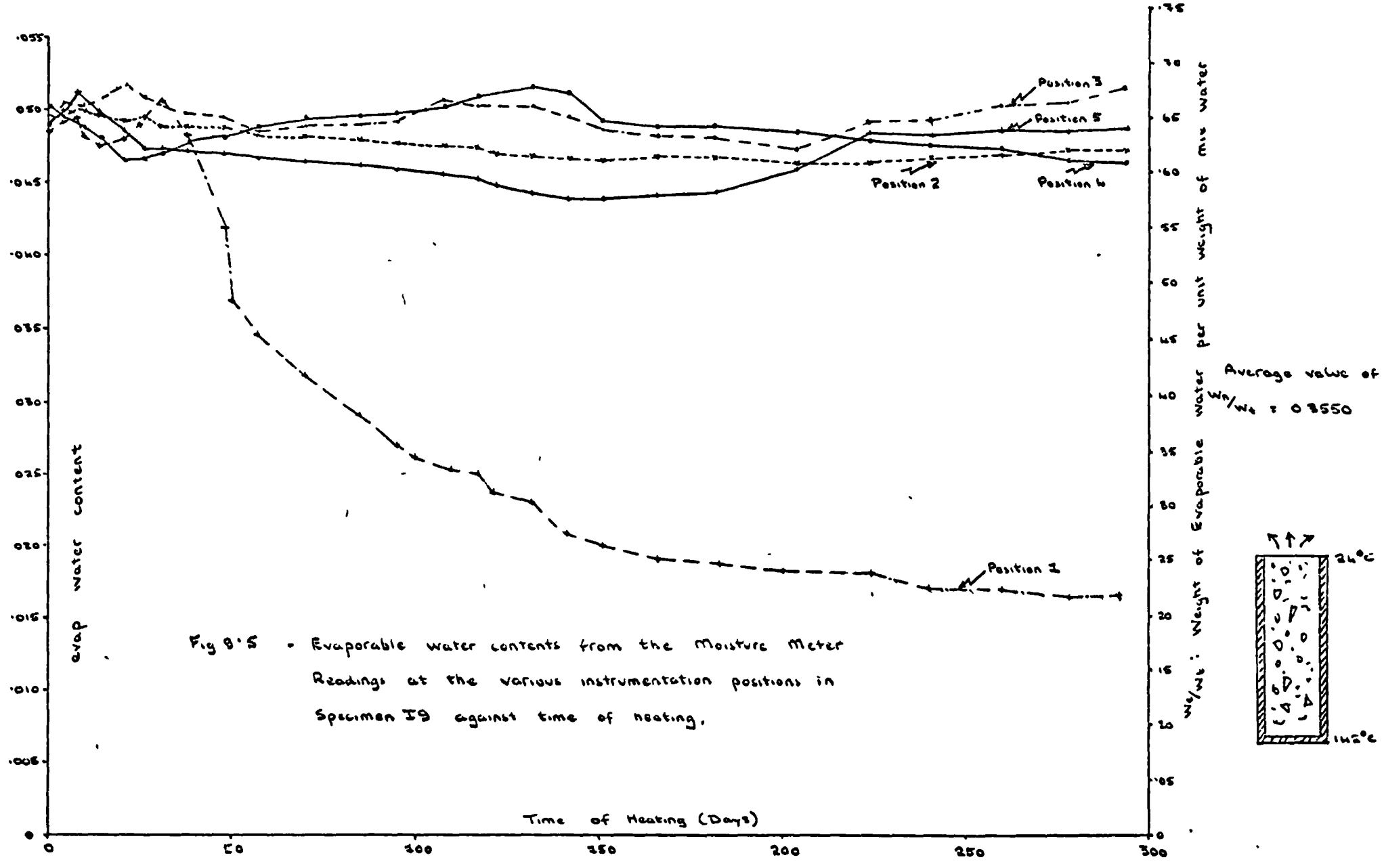
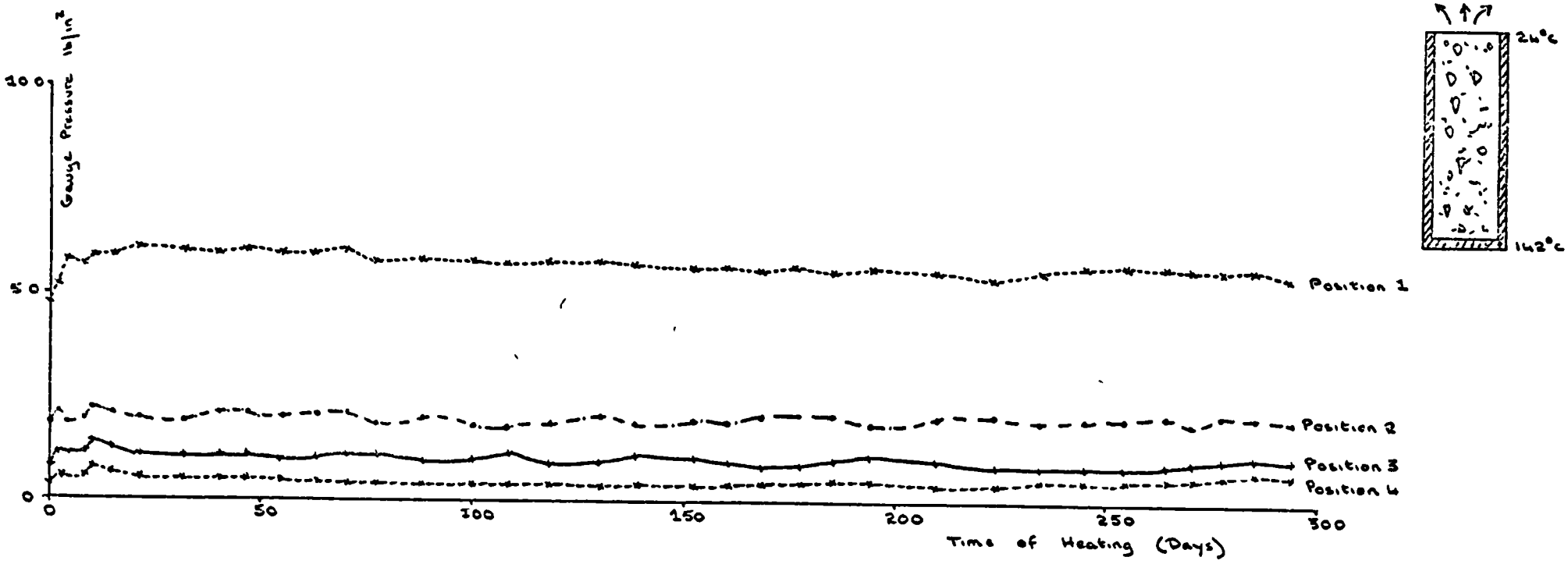


Fig 8·5 - Evaporable water contents from the Moisture Meter Readings at the various instrumentation positions in Specimen I9 against time of heating.

Fig 9:6 - Gauge Pore Pressures measured at the various instrumentation positions against time of heating for Specimen I 9.

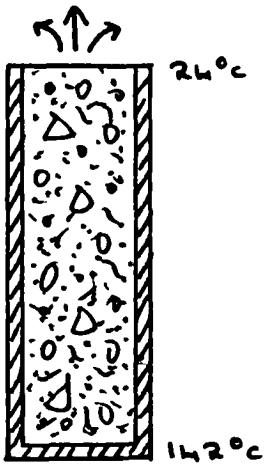


W_n/W_t : Weight of Non-Evaporable water per unit weight of mix water

0 0·9 0·8 0·7 0·6 0·5 0·4 0·3 0·2 0·1

5ft

Fig 9:7 - Phase Diagram for water in Specimen I9 at the end of time of heating of 29½ days



4ft

3ft

Distance from Base - ft

2ft

Evaporable water distribution

1ft

Non-Evaporable water distribution

Area of Water Loss

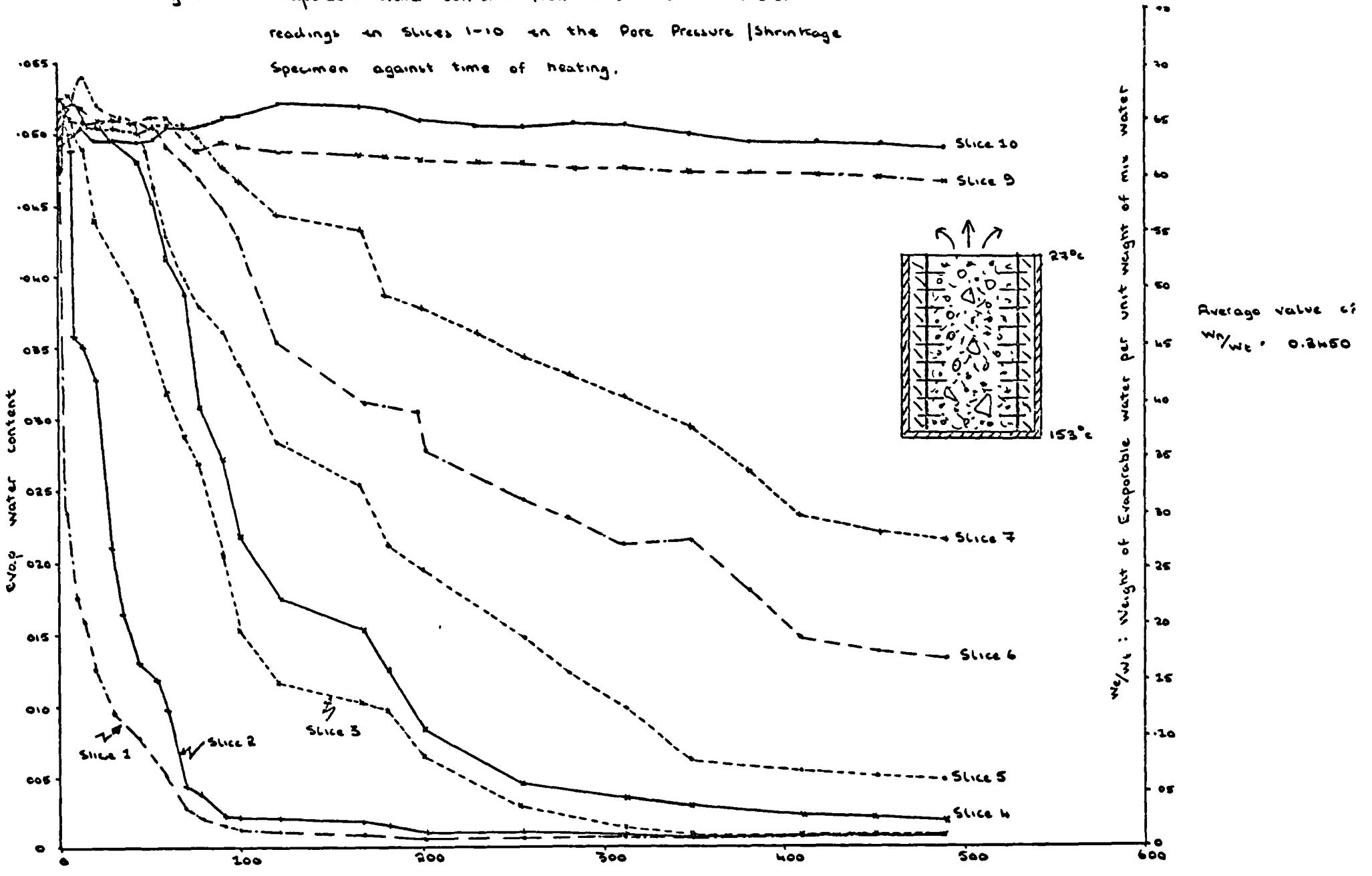
Area of Water Gain

BASE

·1 ·2 ·3 ·4 ·5 ·6 ·7 ·8 ·9

W_e/W_t : Weight of Evaporable water per unit weight of mix water

Fig 8·8 - Evaporable water contents from the Moisture meter readings in Slices 1-10 in the Pore Pressure / Shrinkage Specimen against time of heating.



Average value of w_n/w_t = 0.2450

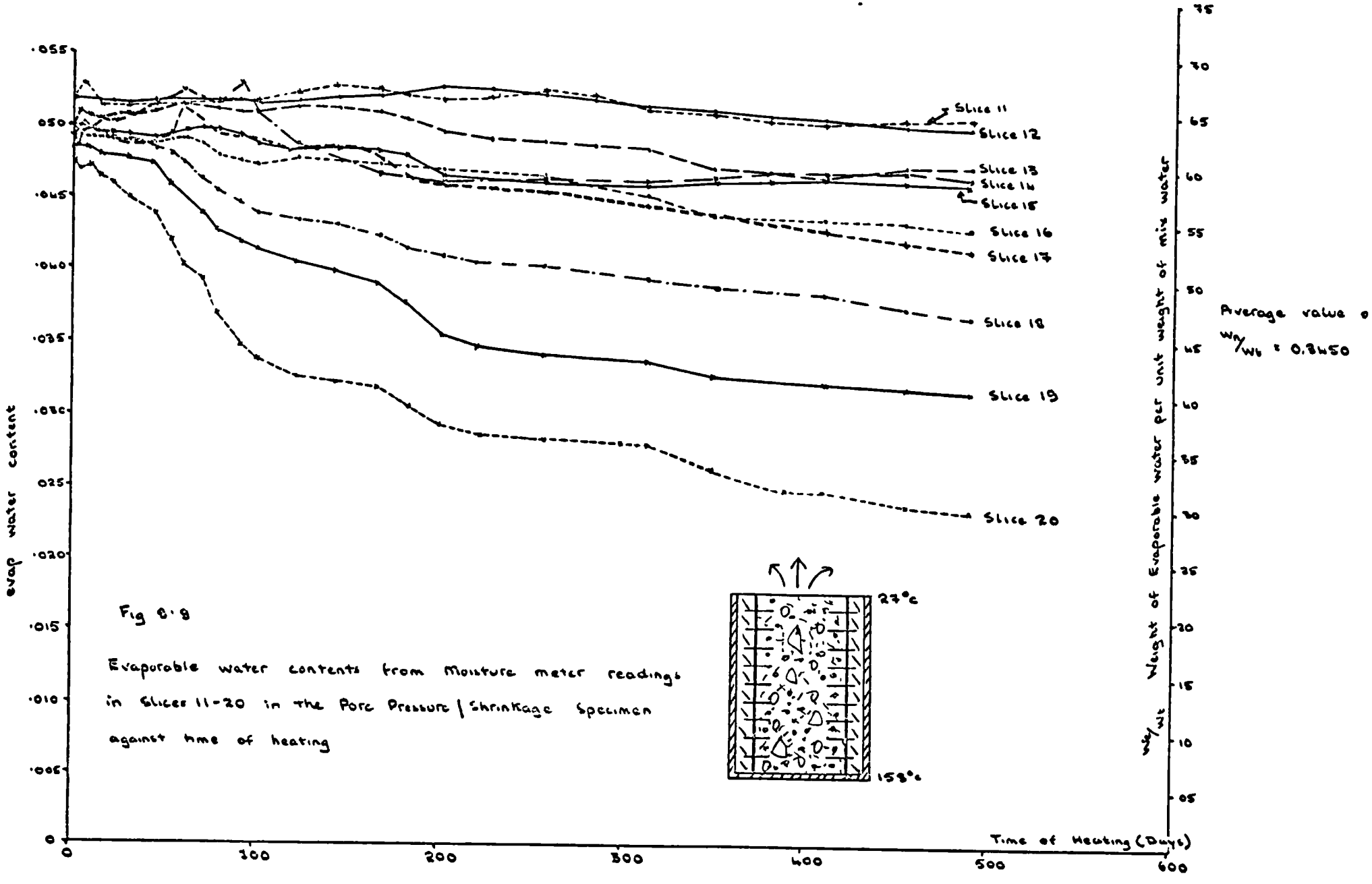


Fig 8·8

Evaporable water contents from Moisture meter readings in Slices 11-20 in the Pore Pressure / Shrinkage Specimen against time of heating

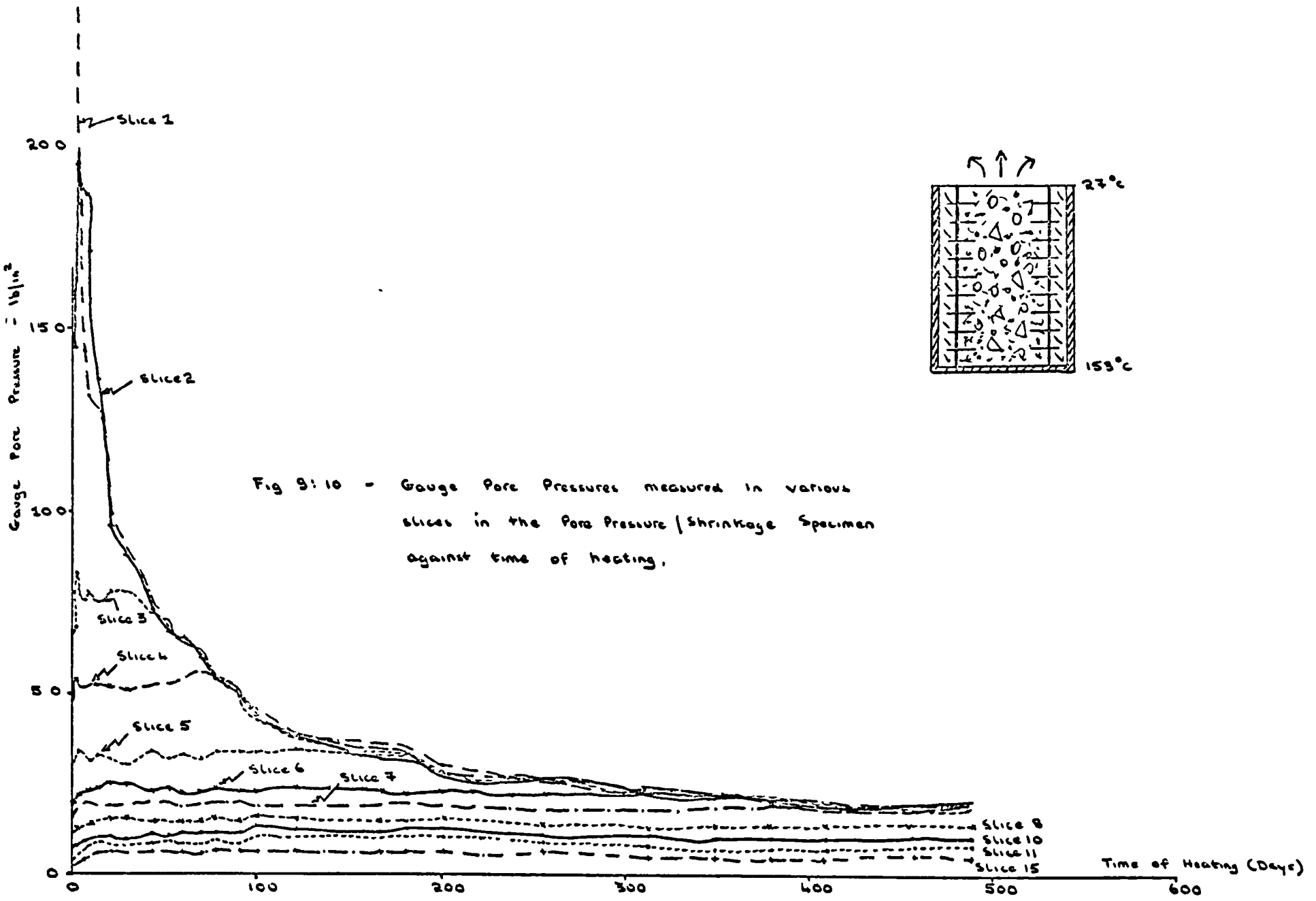


Fig 9:10 - Gauge Pore Pressures measured in various slices in the Pore Pressure / Shrinkage Specimen against time of heating.

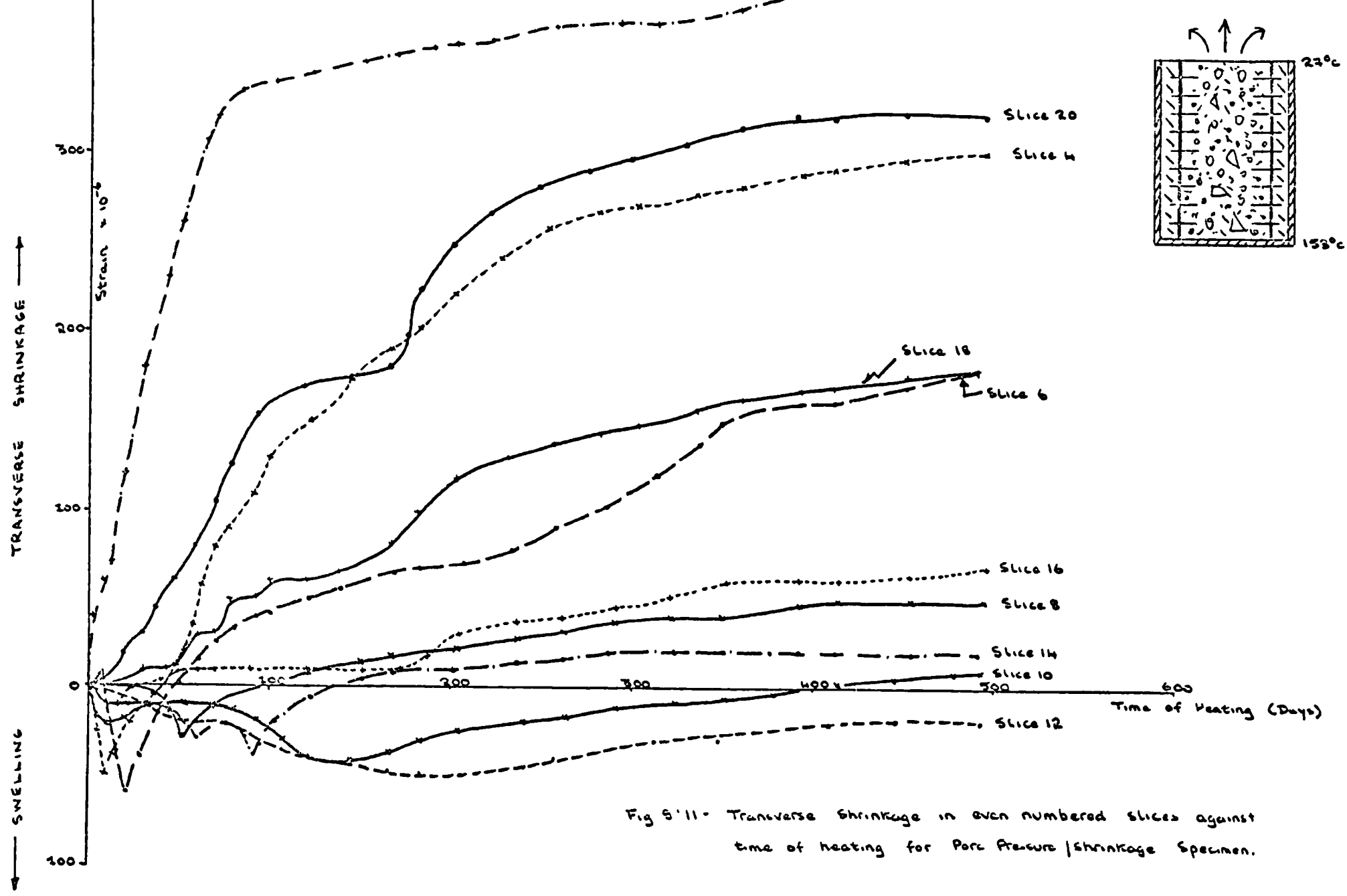


Fig 5·11· Transverse shrinkage in even numbered slices against time of heating for Pore Pressure/Shrinkage Specimen.

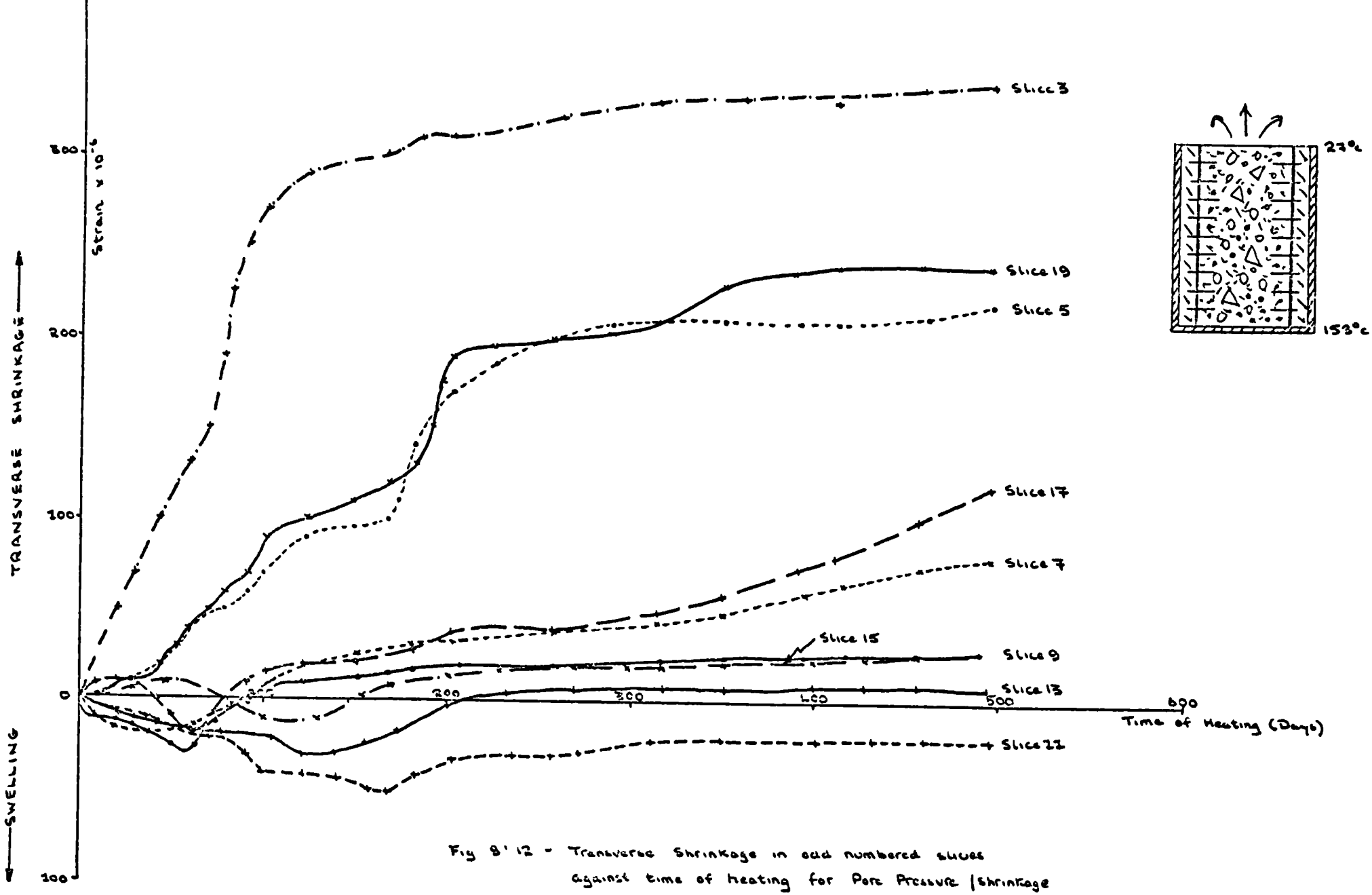


Fig 8·12 - Transverse shrinkage in odd numbered slices against time of heating for Pore Pressure / Shrinkage Specimen.

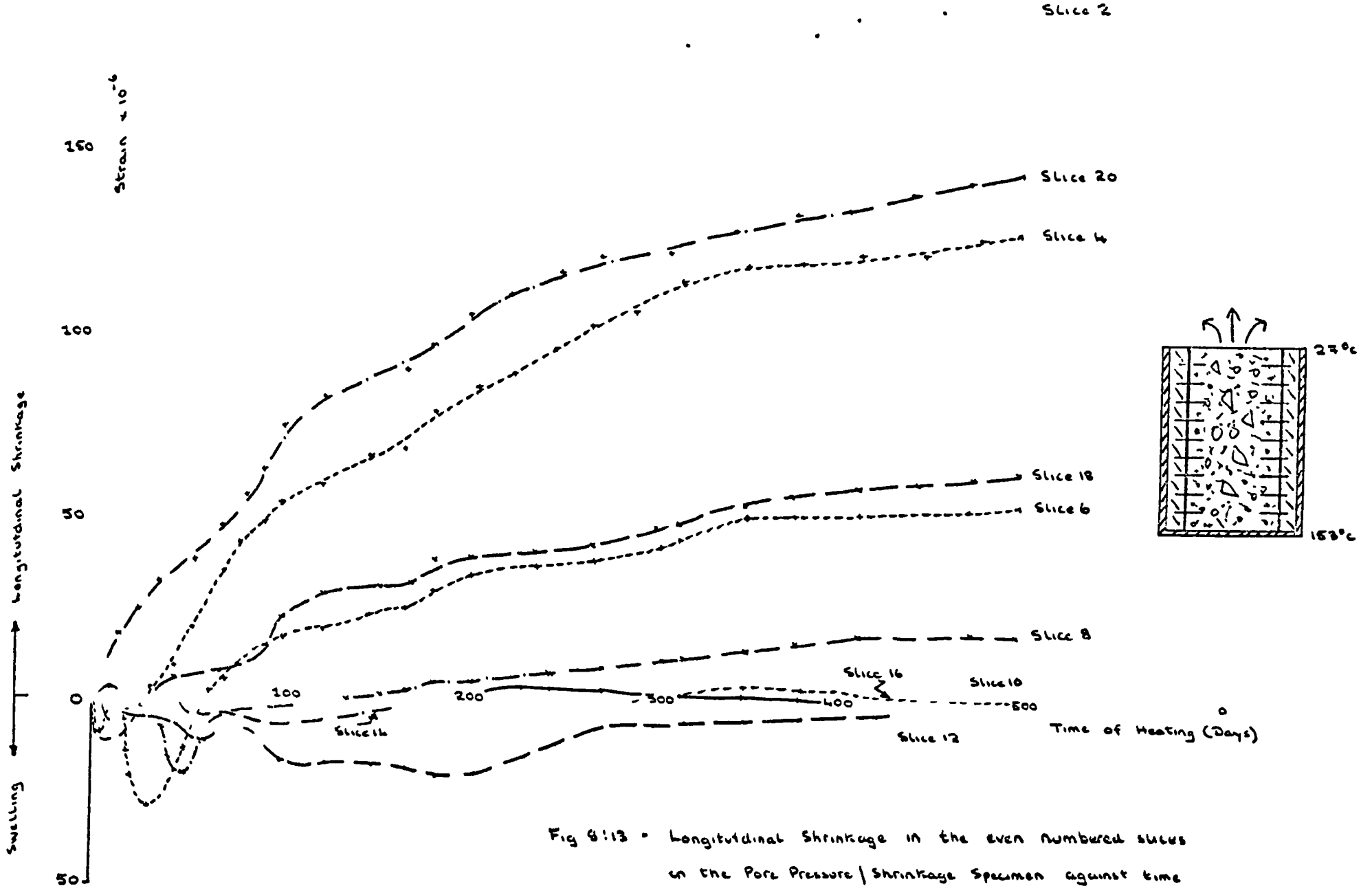
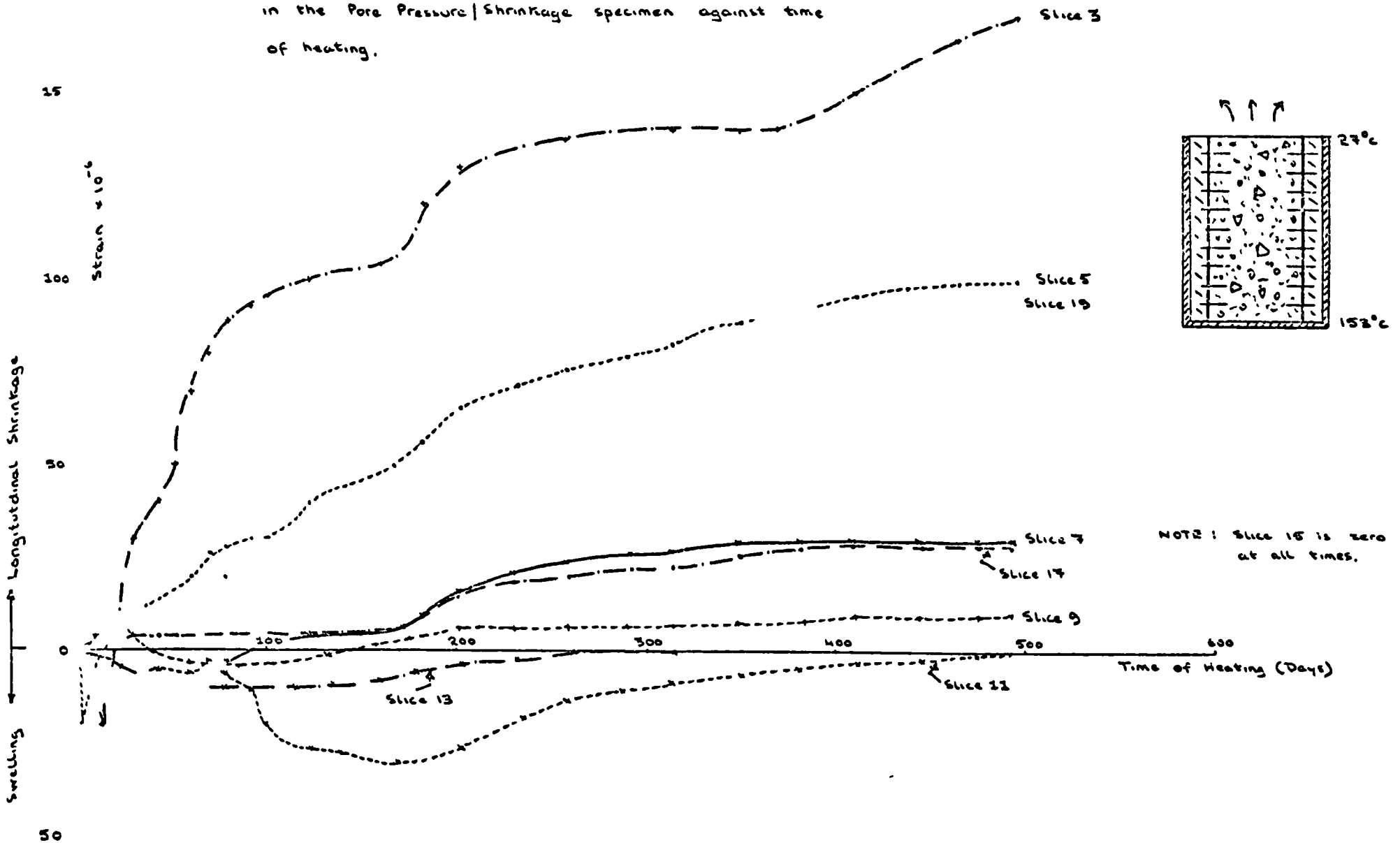


Fig 8:13 - Longitudinal Shrinkage in the even numbered slices in the Pore Pressure / Shrinkage Specimen against time of heating

Fig 9:16 - Longitudinal shrinkage in the odd numbered slices in the Pore Pressure / Shrinkage specimen against time of heating.



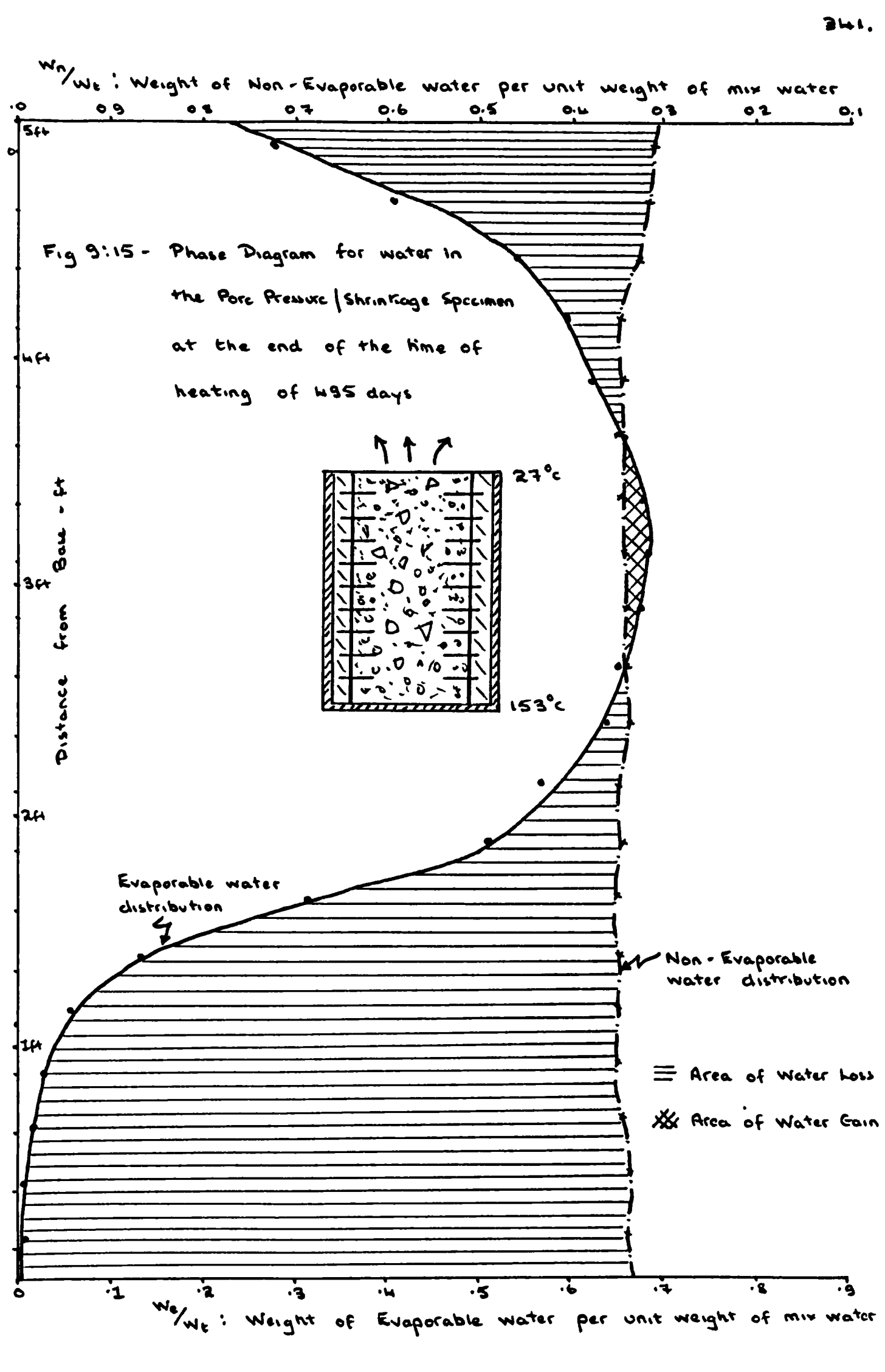
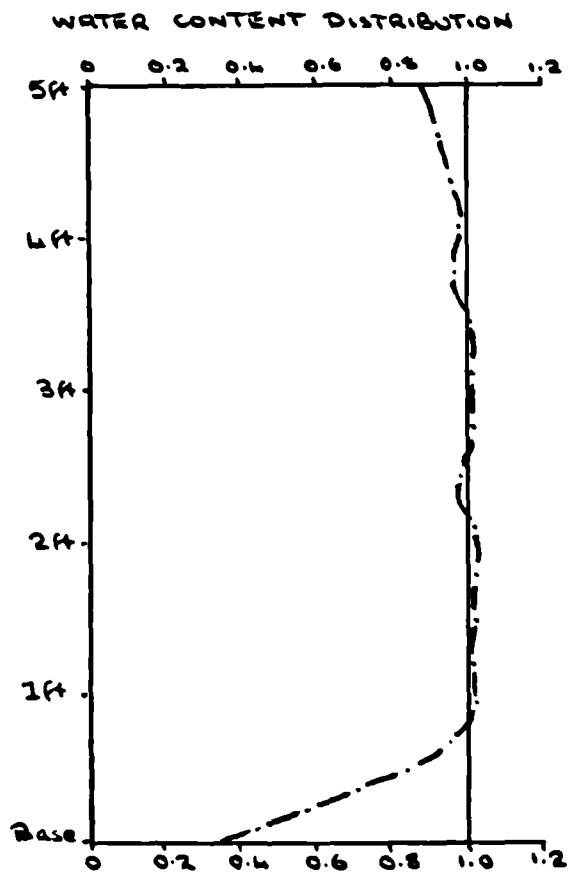
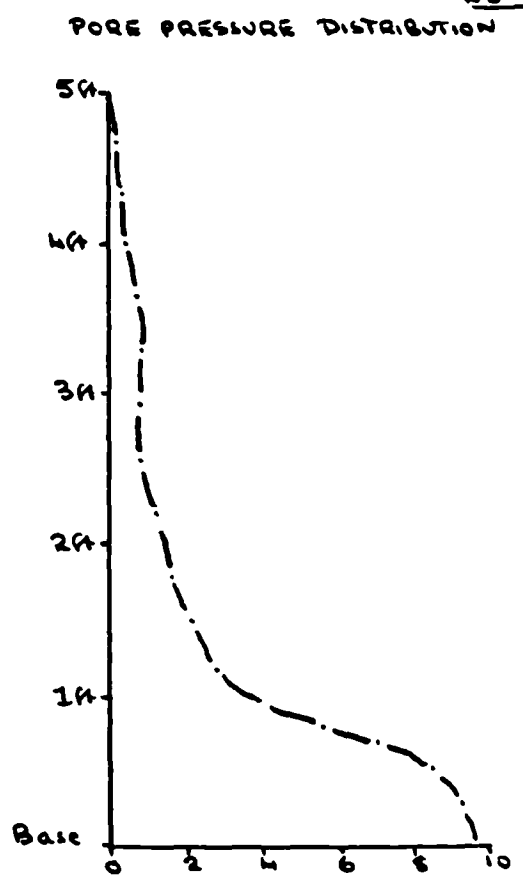


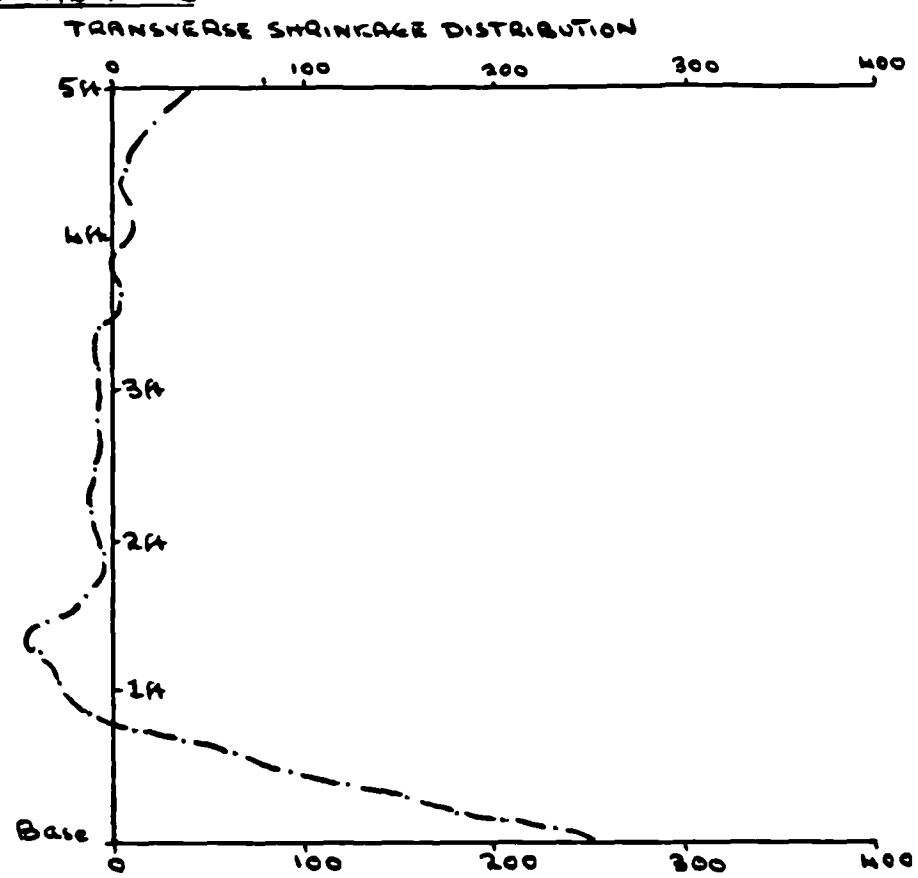
Fig 9:15 - Phase Diagram for water in the Pore Pressure/Shrinkage Specimen at the end of the time of heating of 495 days

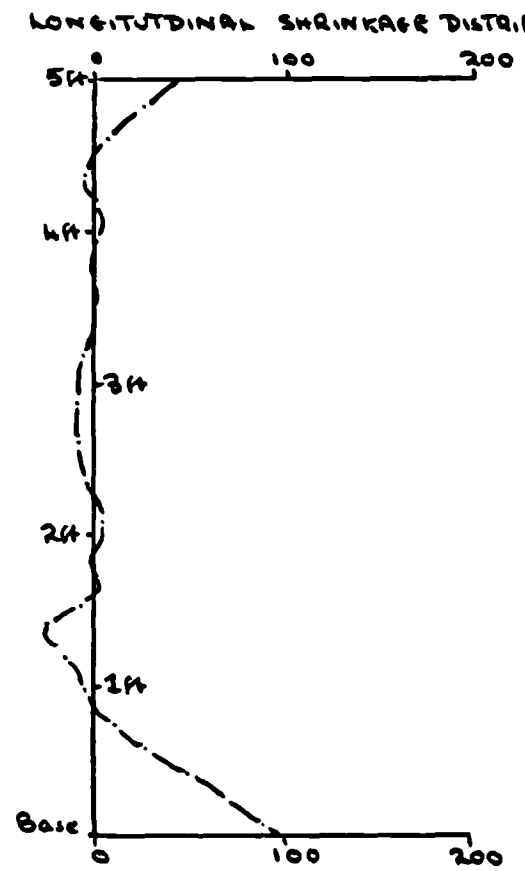
Fig 9:16 (a) - Water Content, Pore Pressure, Transverse and Longitudinal Shrinkage Distributions for the Pore Pressure/Shrinkage Specimen after 25 and 100 days of heating.

25 DAYS HEATING

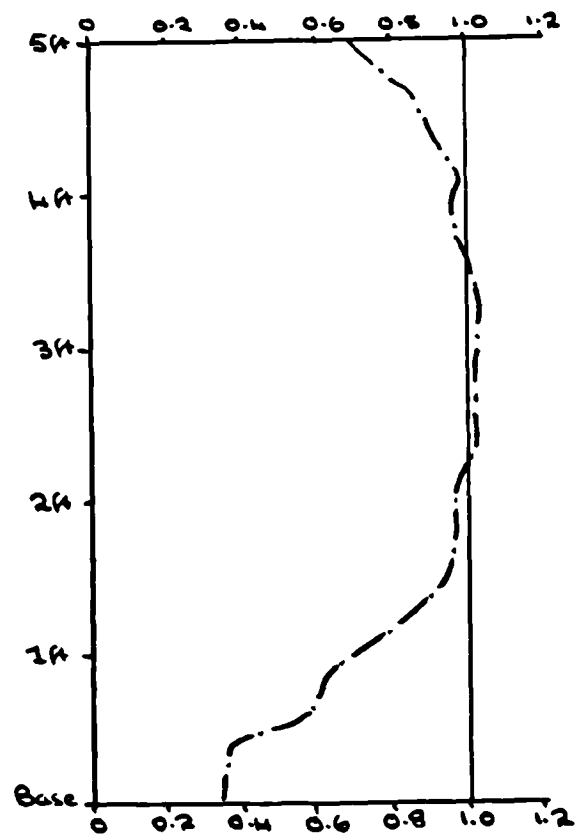


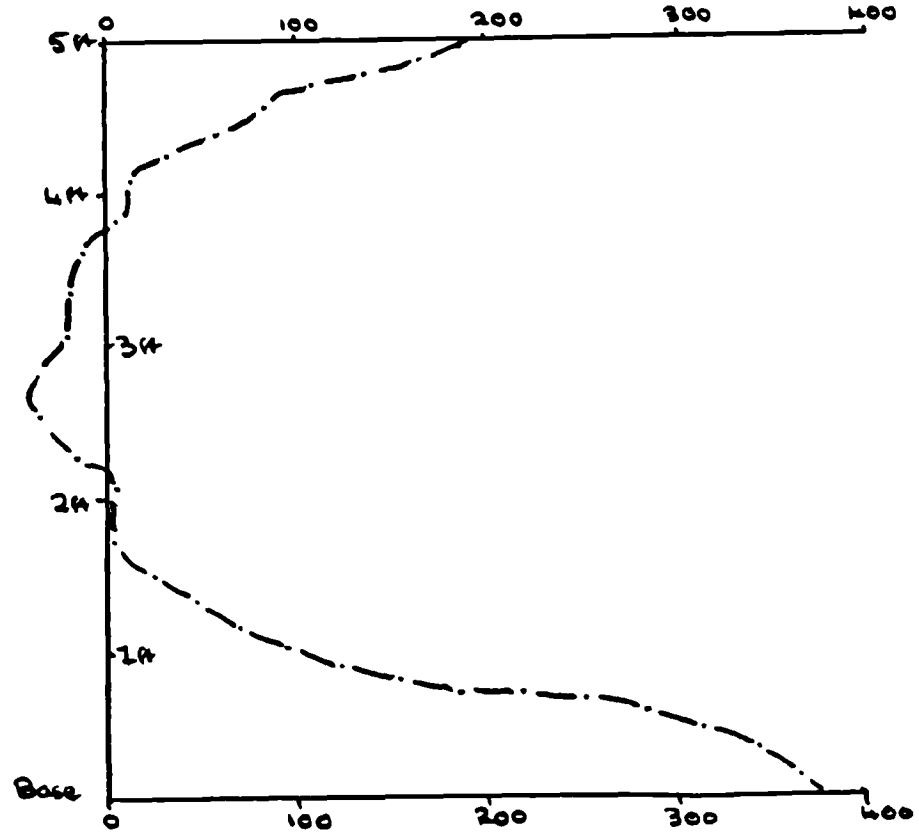






100 DAYS HEATING





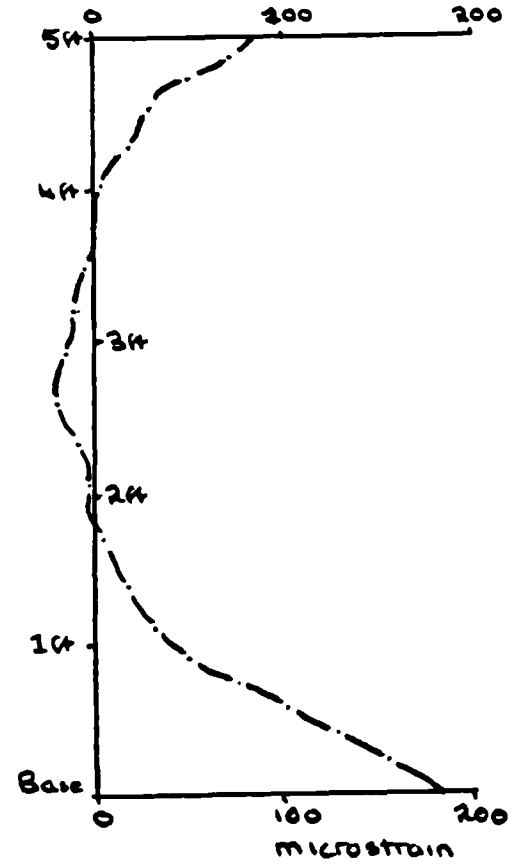
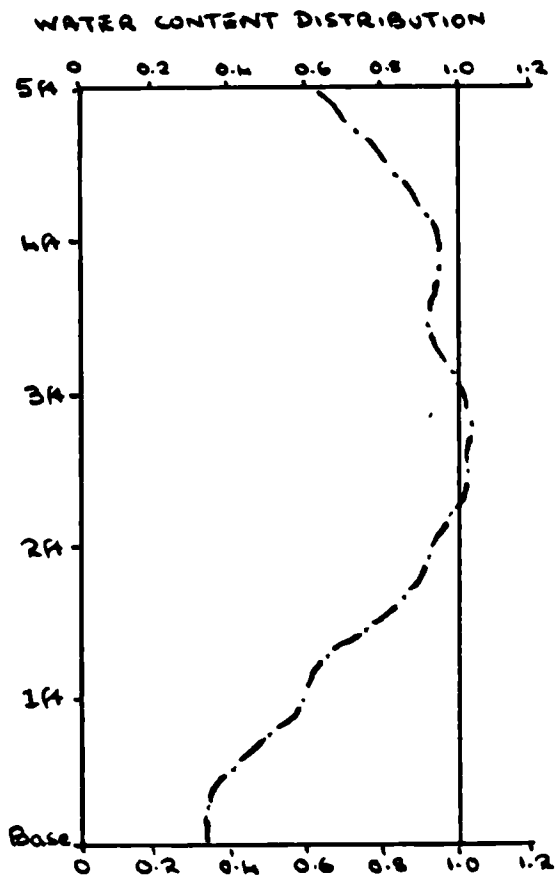
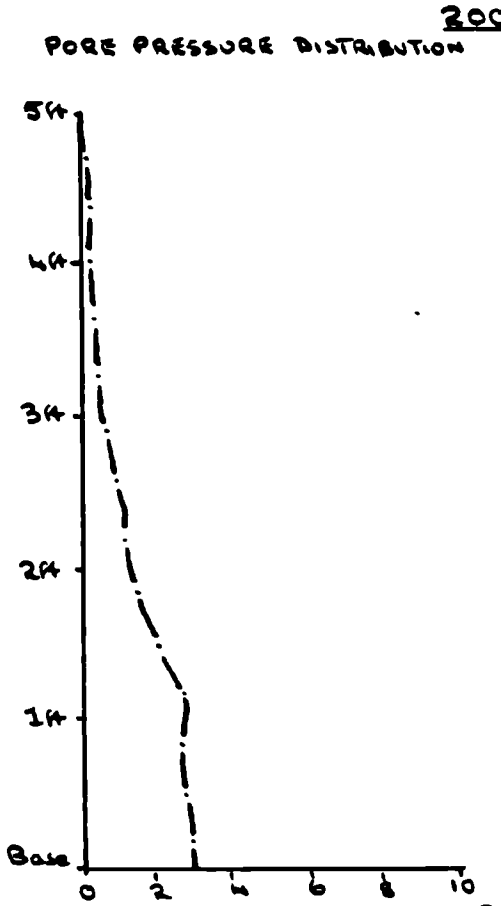
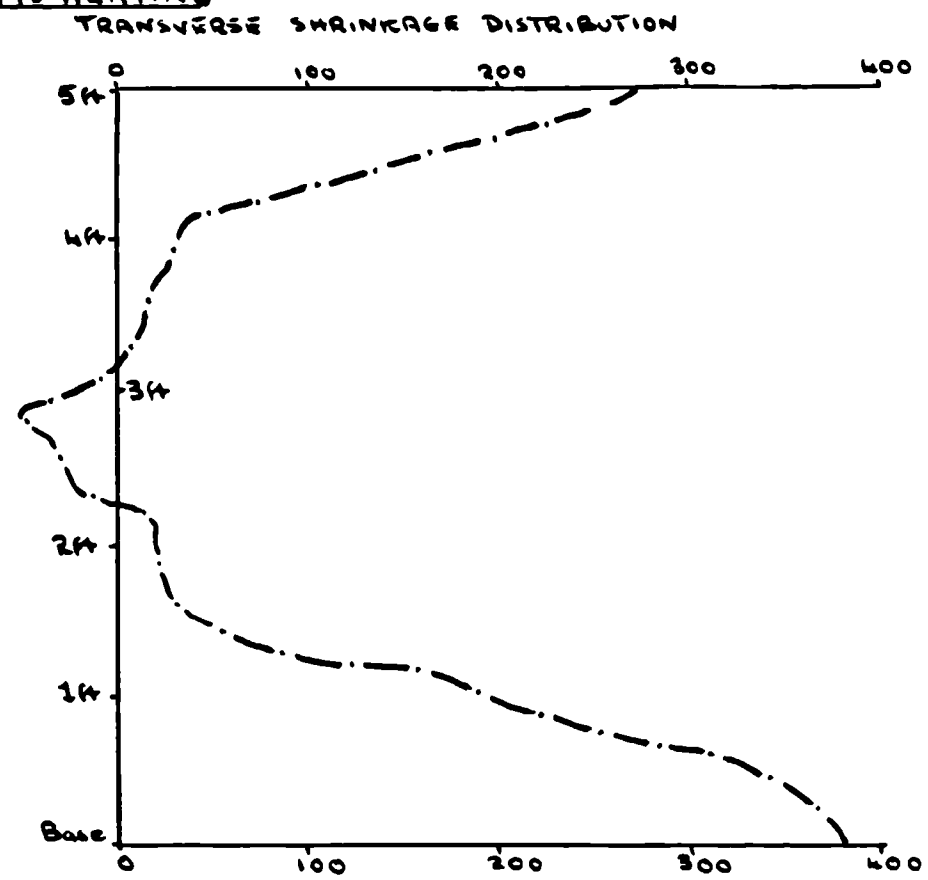


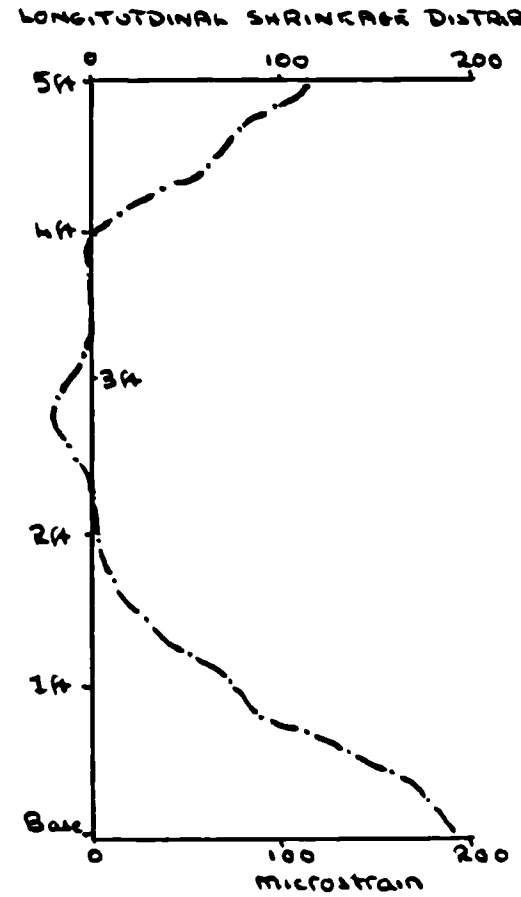
Fig 9:16 (b) - Water Content, Pore Pressure, Transverse and Longitudinal Shrinkage Distributions for the Pore Pressure/Shrinkage Specimen after 200 and 300 days of heating.

200 DAYS HEATING

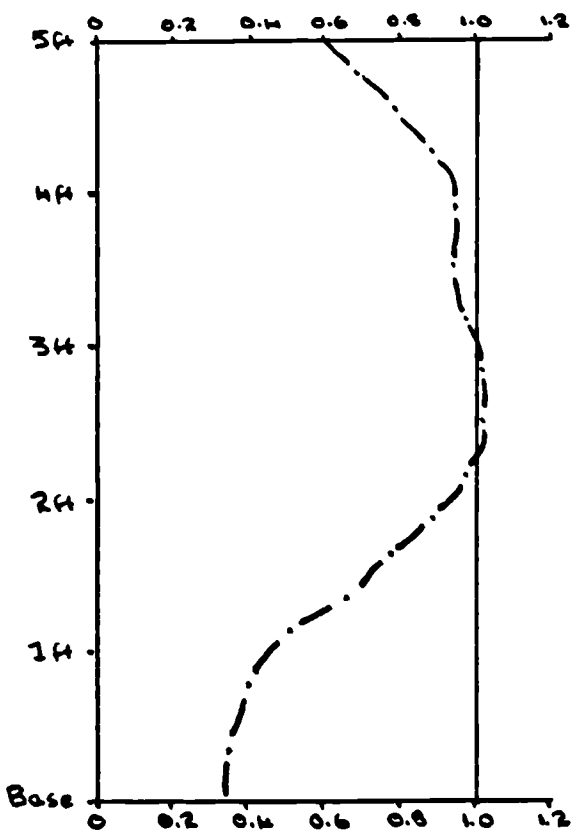


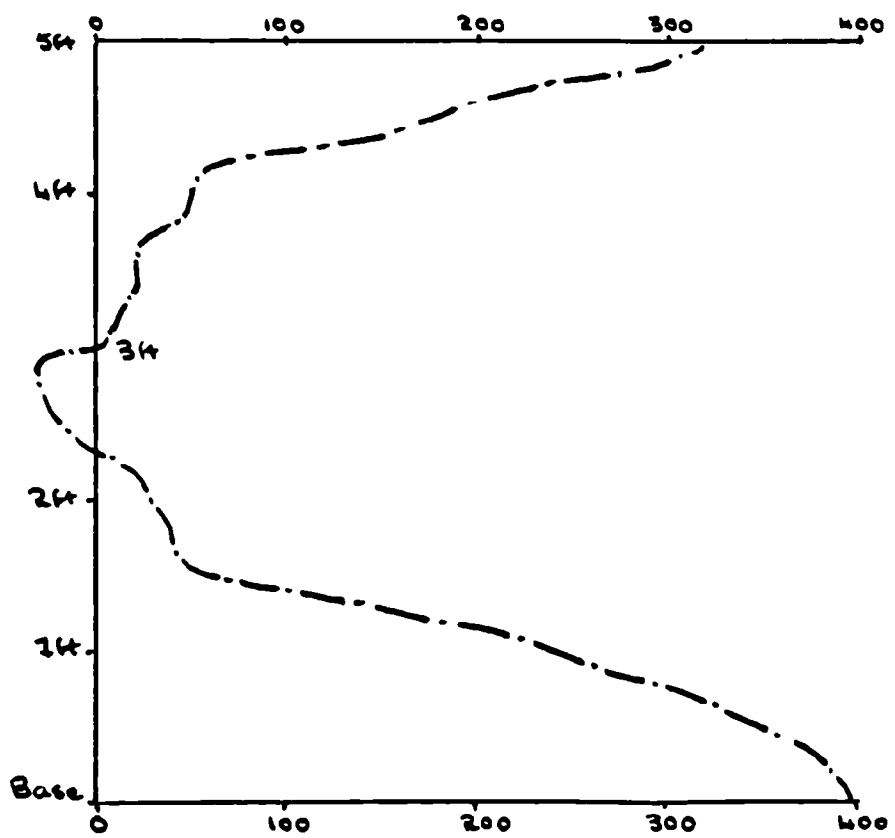






300 DAYS HEATING





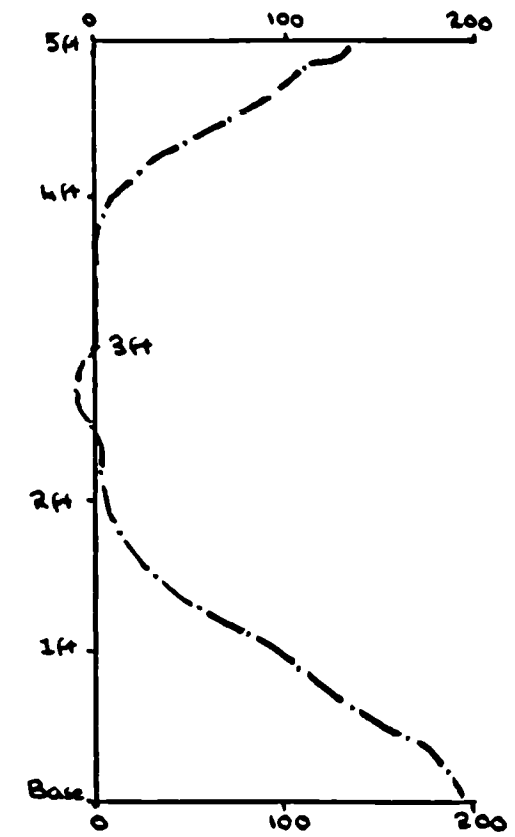
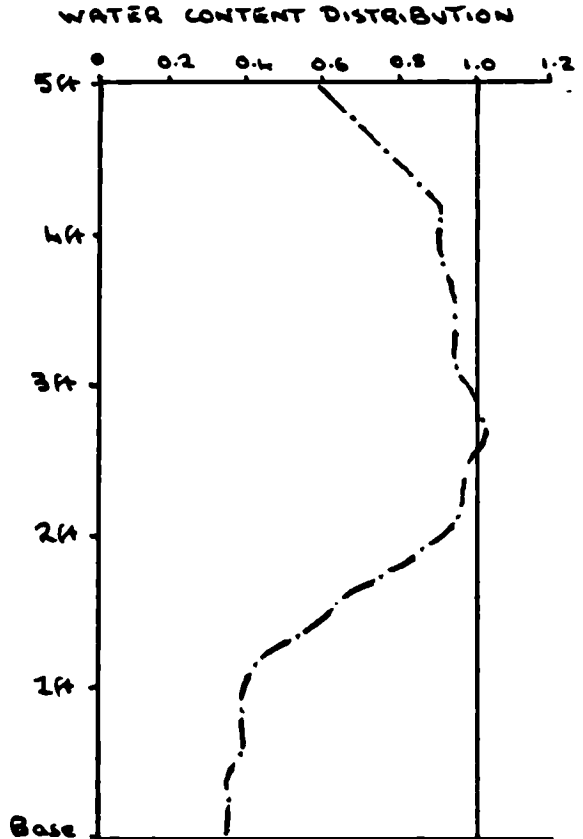
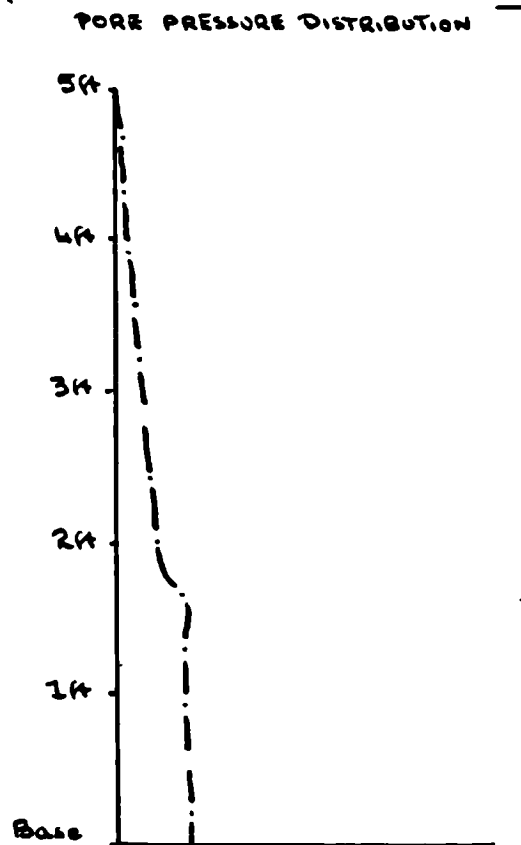
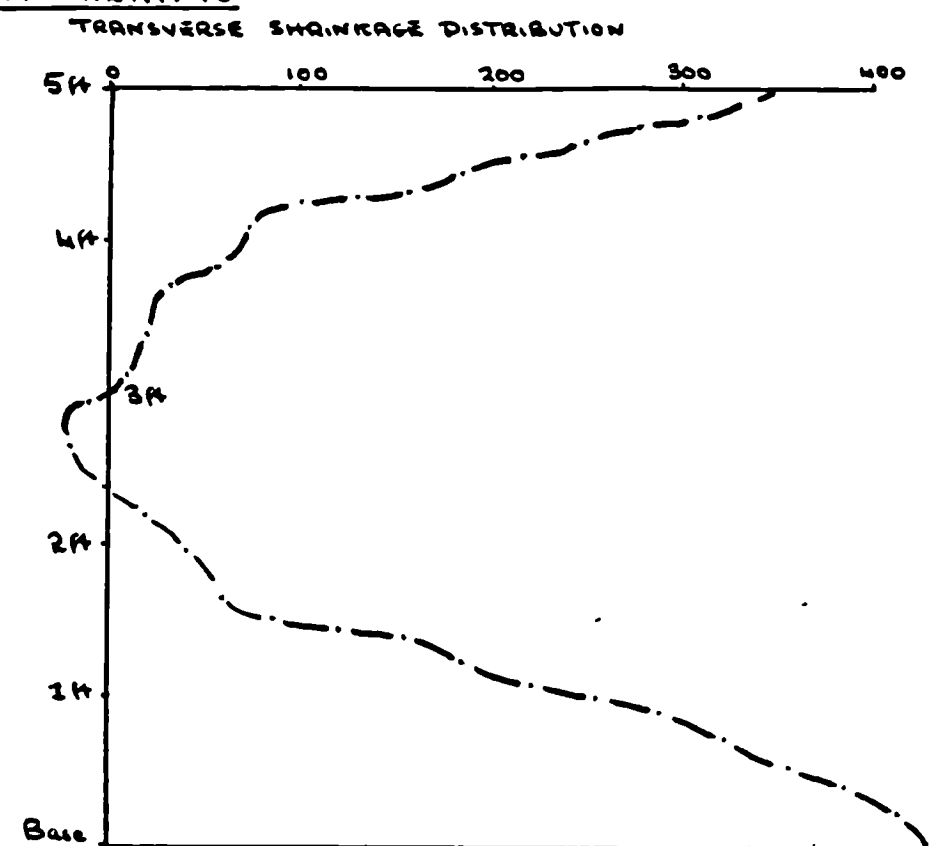


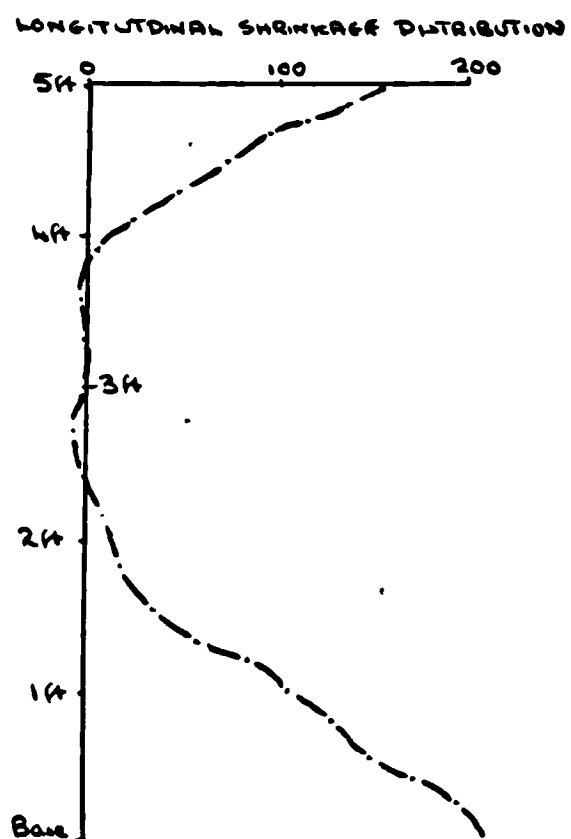
Fig 9:16 (c) - Water Content, Pore Pressure, Transverse and Longitudinal Shrinkage Distributions for the Pore Pressure / Shrinkage Specimen after 400 and 495 days of heating.

400 DAYS HEATING

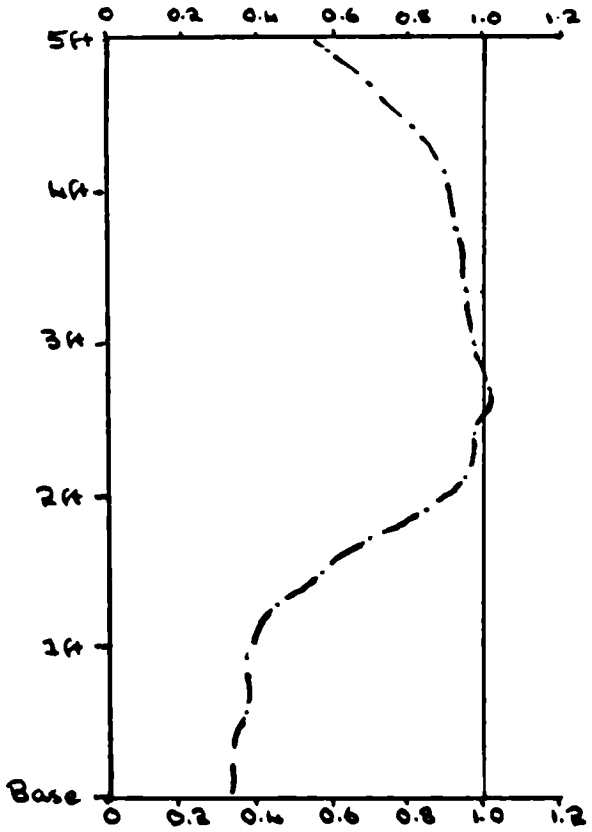


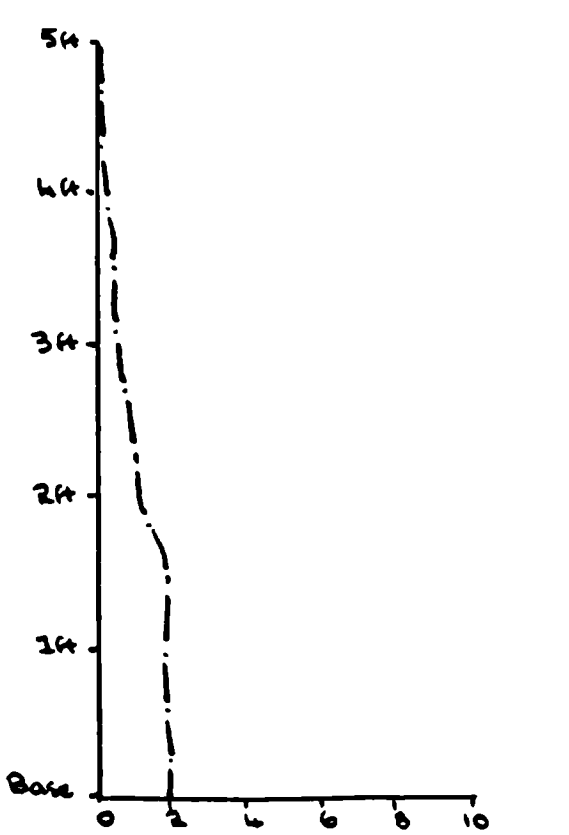


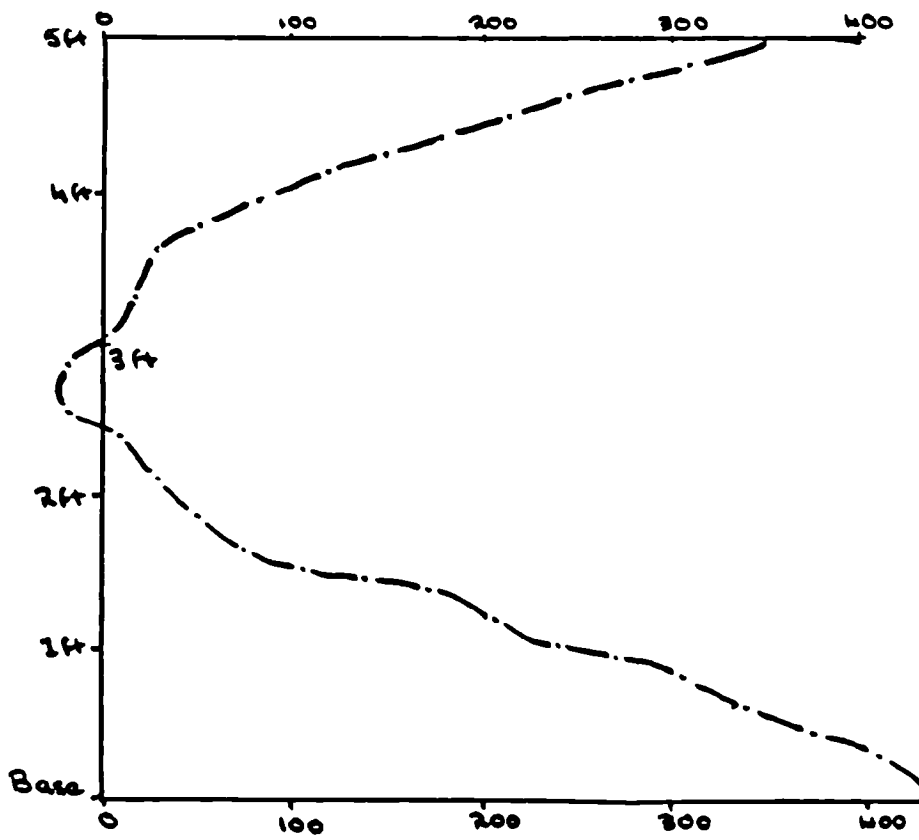


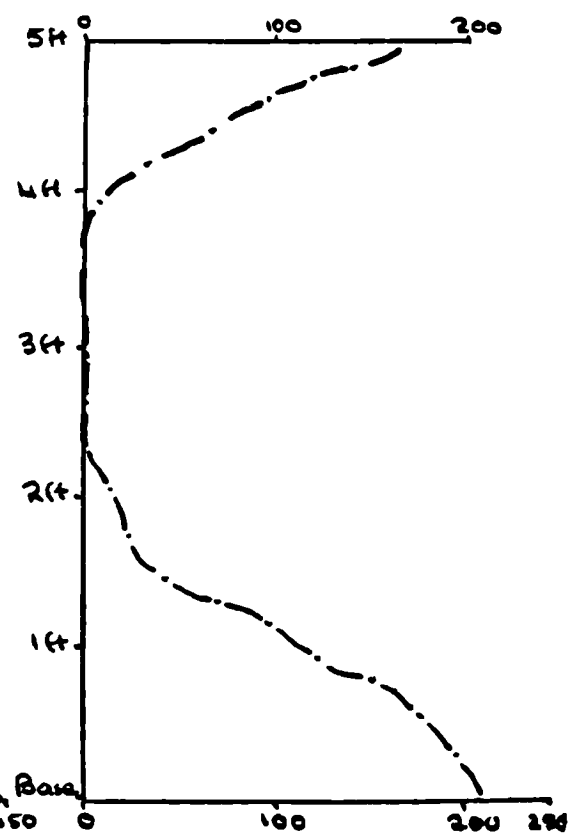


495 DAYS HEATING









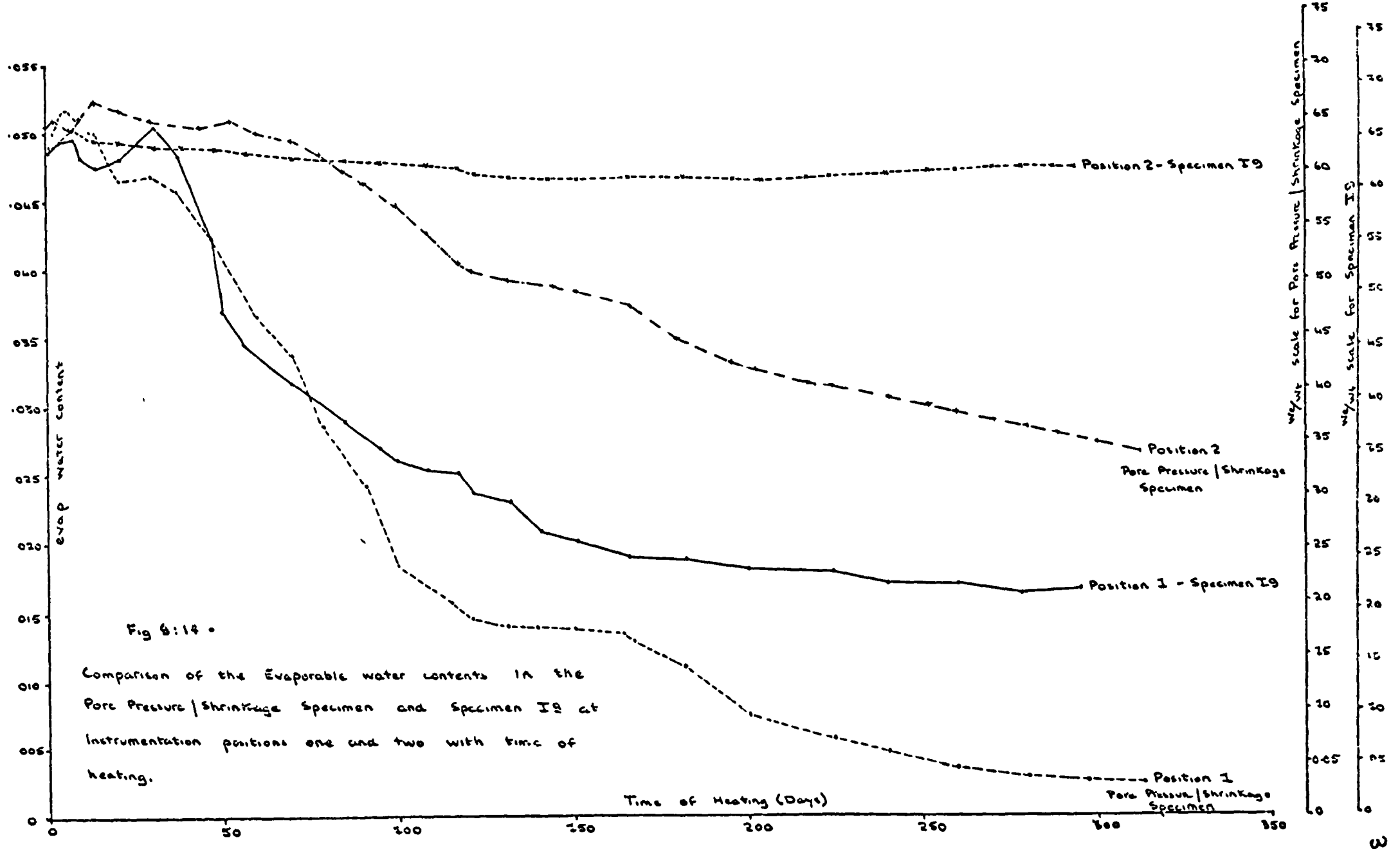


Fig 6:14 .

Comparison of the Evaporable water contents in the Pore Pressure / Shrinkage Specimen and Specimen I9 at instrumentation positions one and two with time of heating.

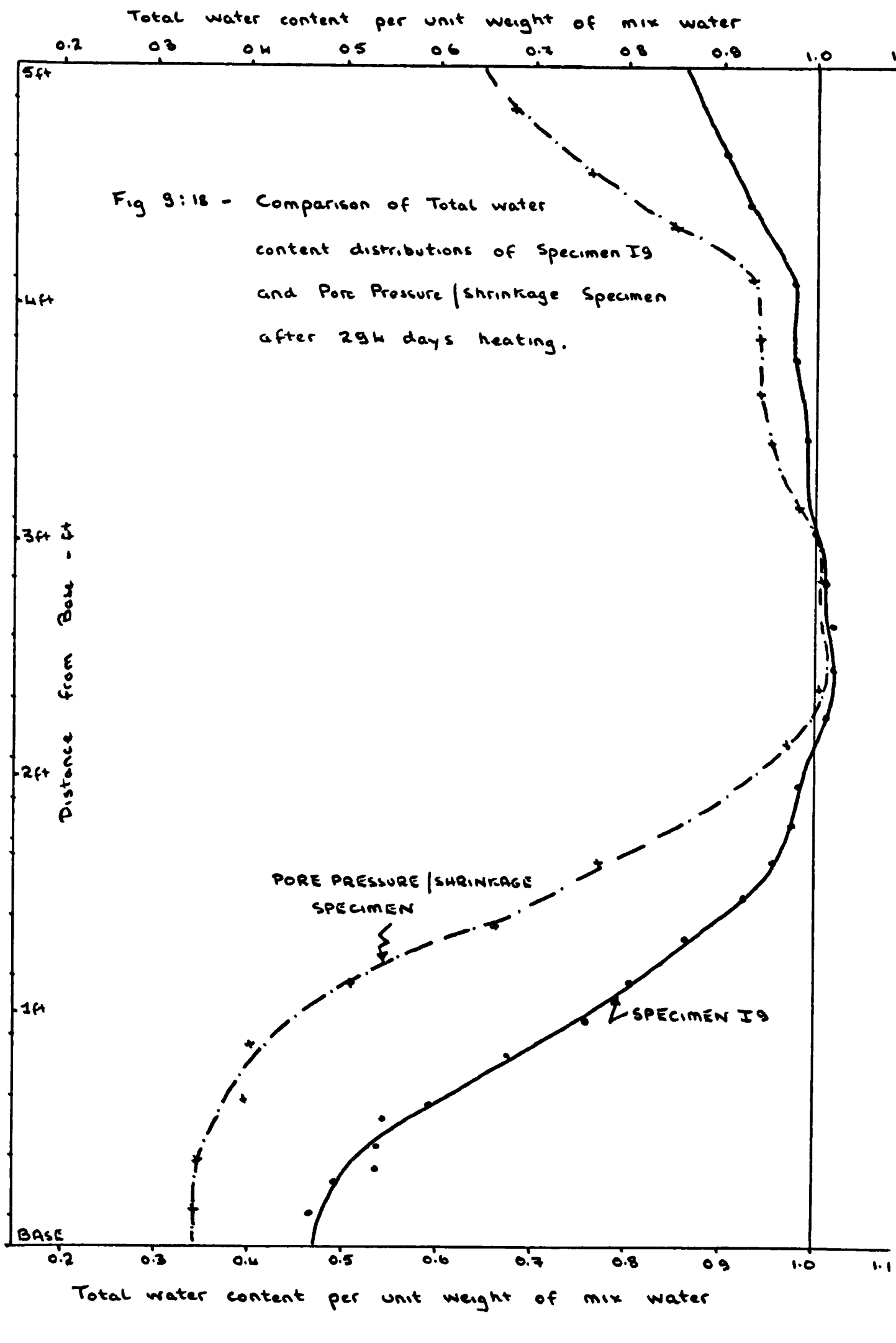


Fig 9:18 - Comparison of Total water content distributions of Specimen I9 and Pore Pressure / Shrinkage Specimen after 294 days heating.

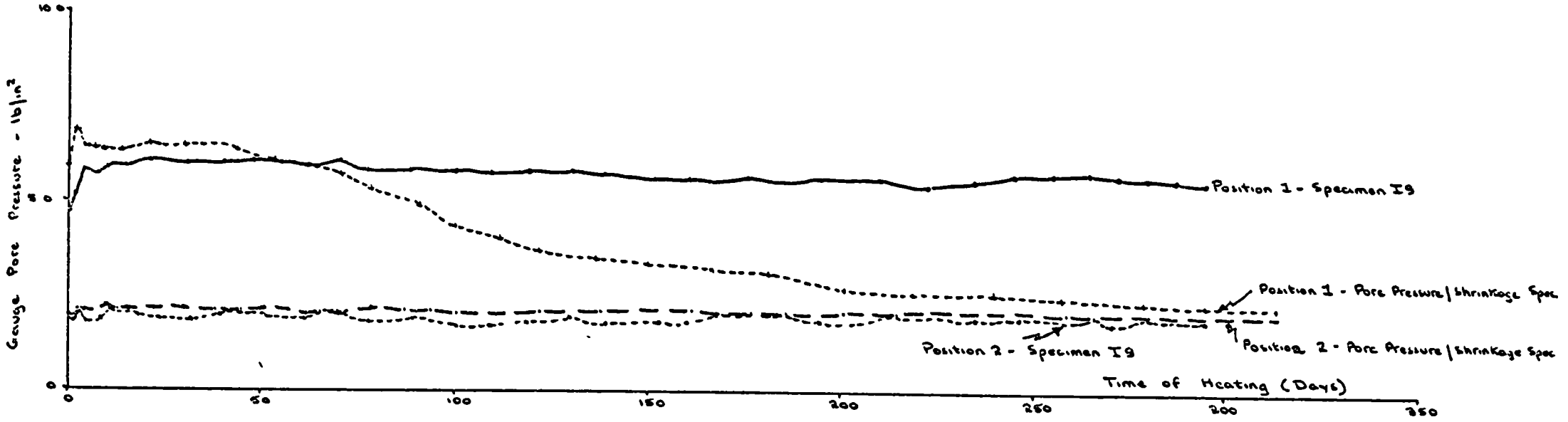


Fig 9 19. Comparison of Gauge Pore Pressures at instrumentation positions 1 and 2 in Specimen I9 and the Pore Pressure/Shrinkage Specimen with Time of heating.

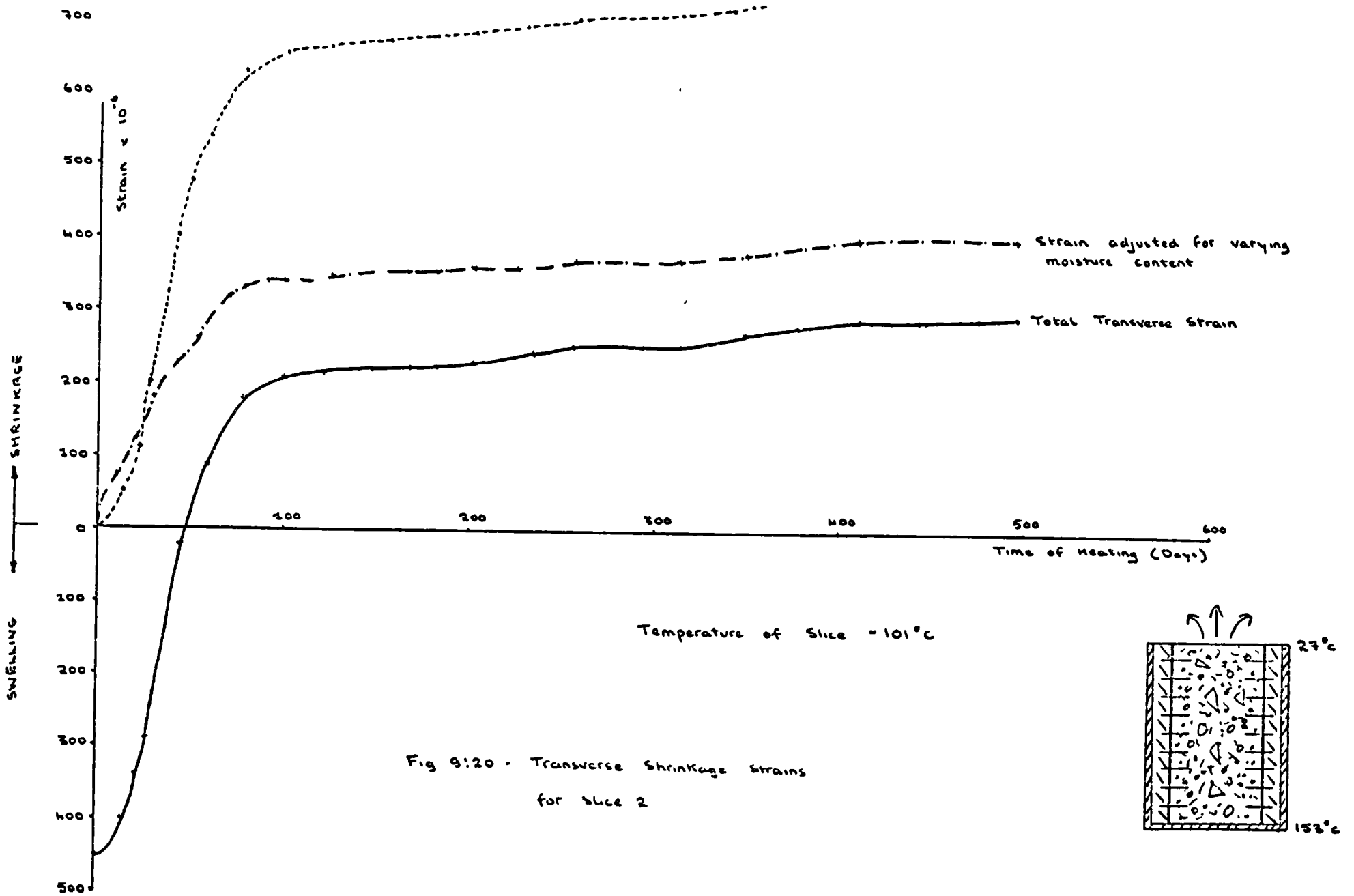
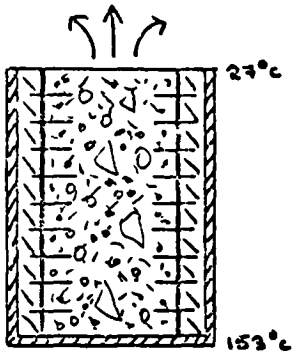


Fig 9:20 - Transverse Shrinkage Strains for Slice 2

Fig 8·21 - Transverse Shrinkage Strains for Slice 10



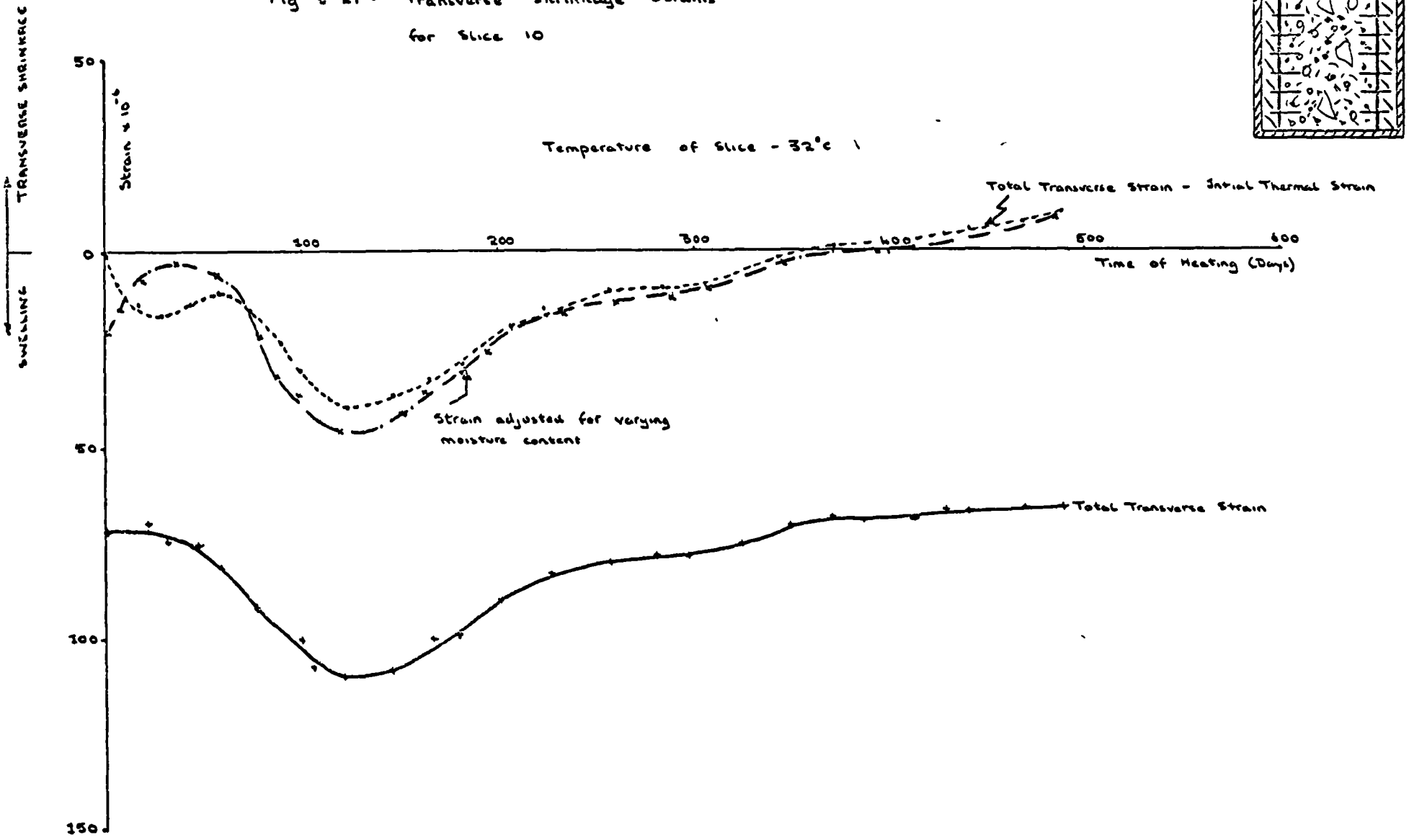
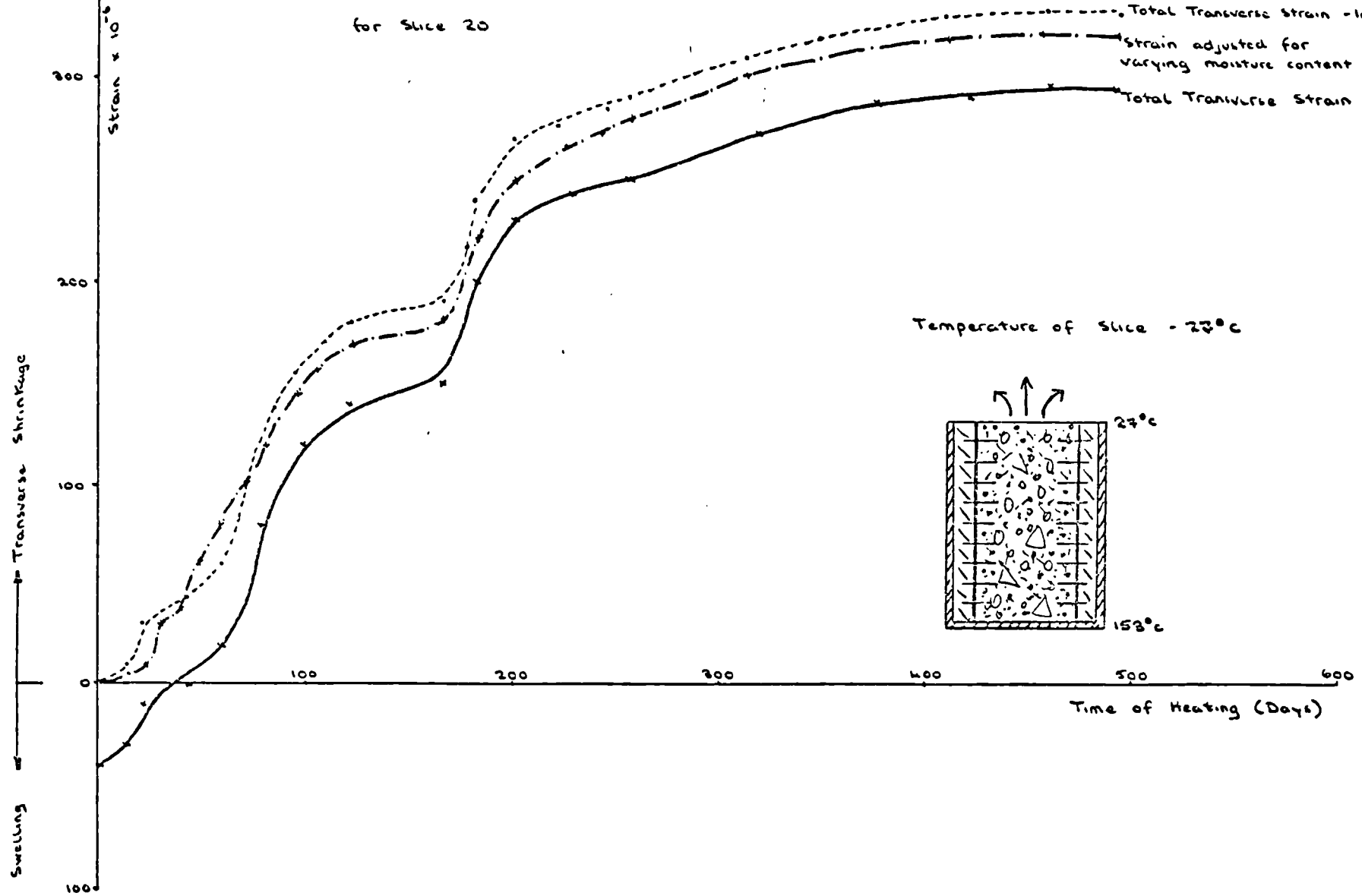


Fig 9:22 - Transverse Shrinkage Strains

for Slice 20



APPENDIX IV - RESULTS OF PORE PRESSURE/SHRINKAGE SPECIMEN AND SUBSIDIARY EXPERIMENTS

FIGURES FOR APPENDIX IV.

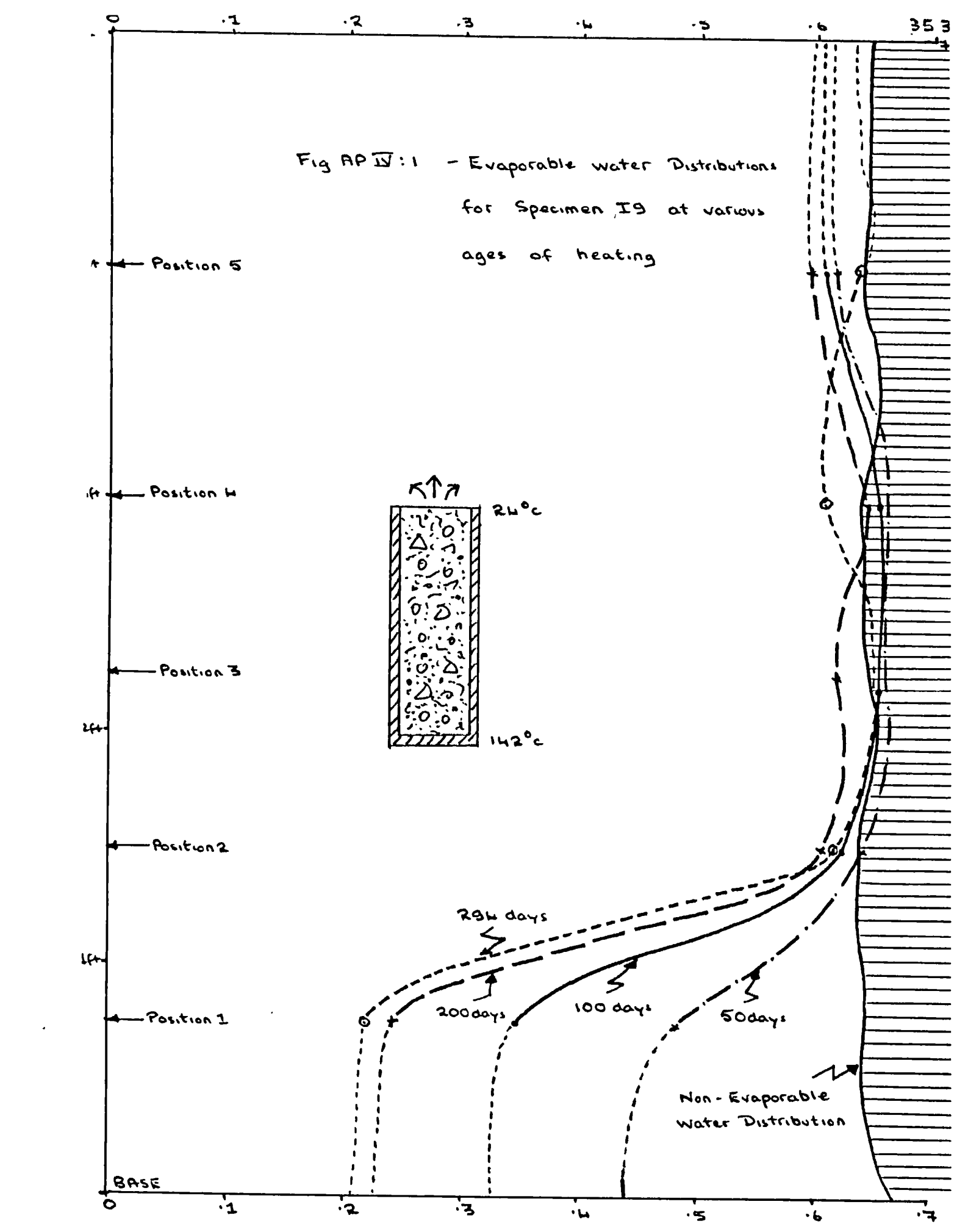
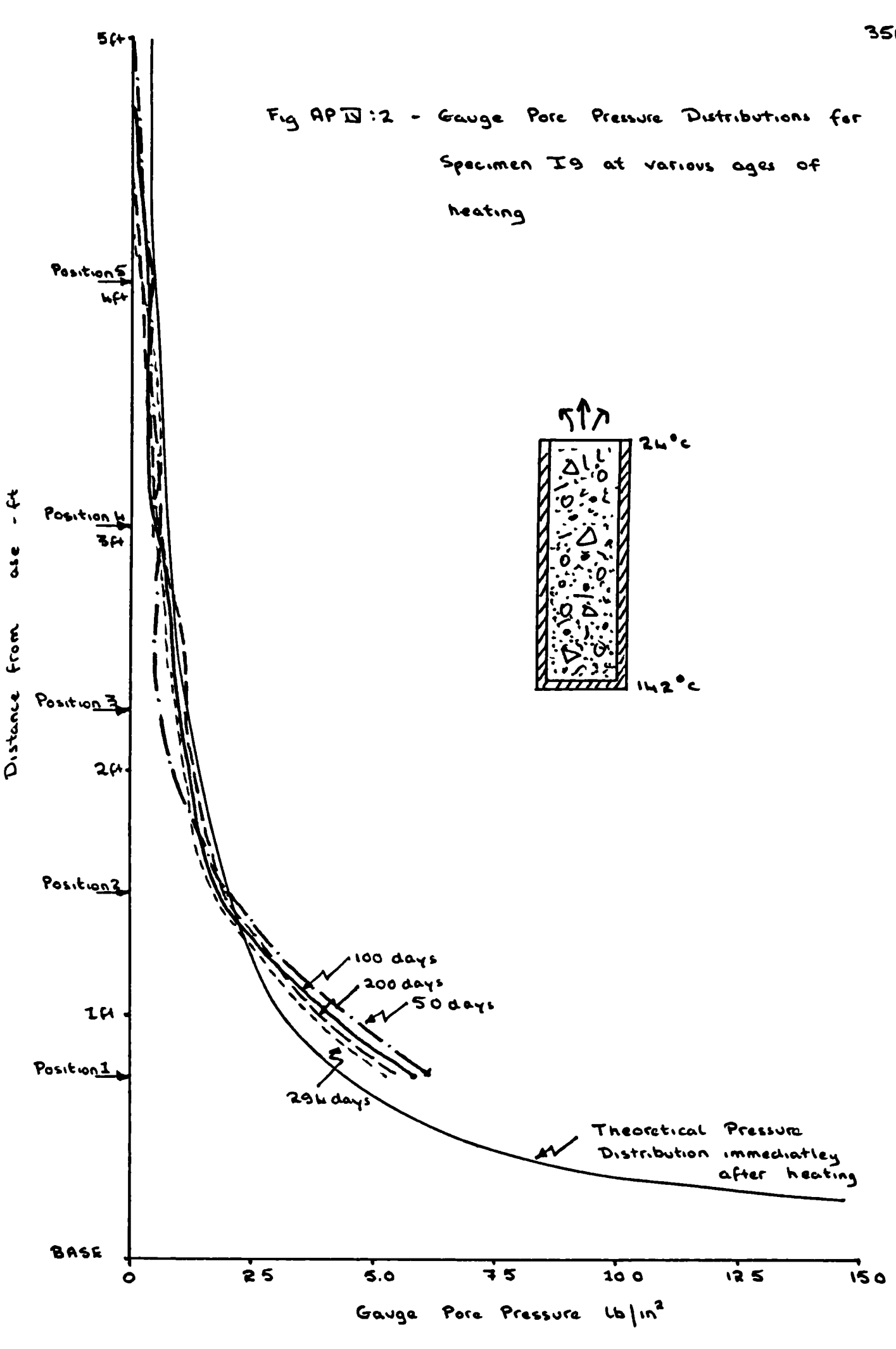


Fig AP IV : 1 - Evaporable water Distributions for Specimen I9 at various ages of heating

w_e/w_t : Evaporable water content per unit weight of mix water

Fig AP IV:2 - Gauge Pore Pressure Distributions for Specimen I9 at various ages of heating



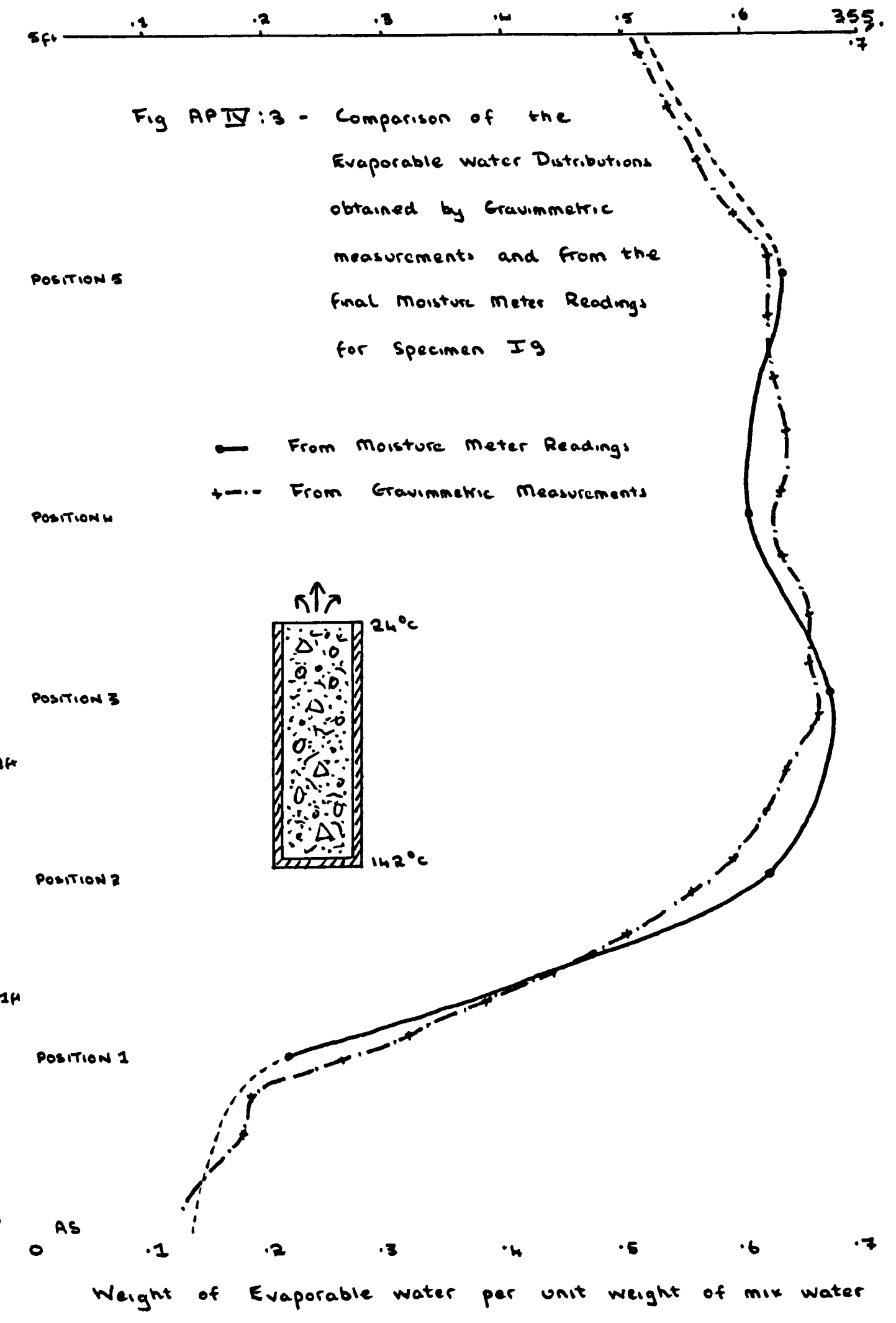


Fig AP IV:3 - Comparison of the Evaporable water Distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for Specimen I9

— From Moisture Meter Readings

+—·— From Gravimmetric Measurements

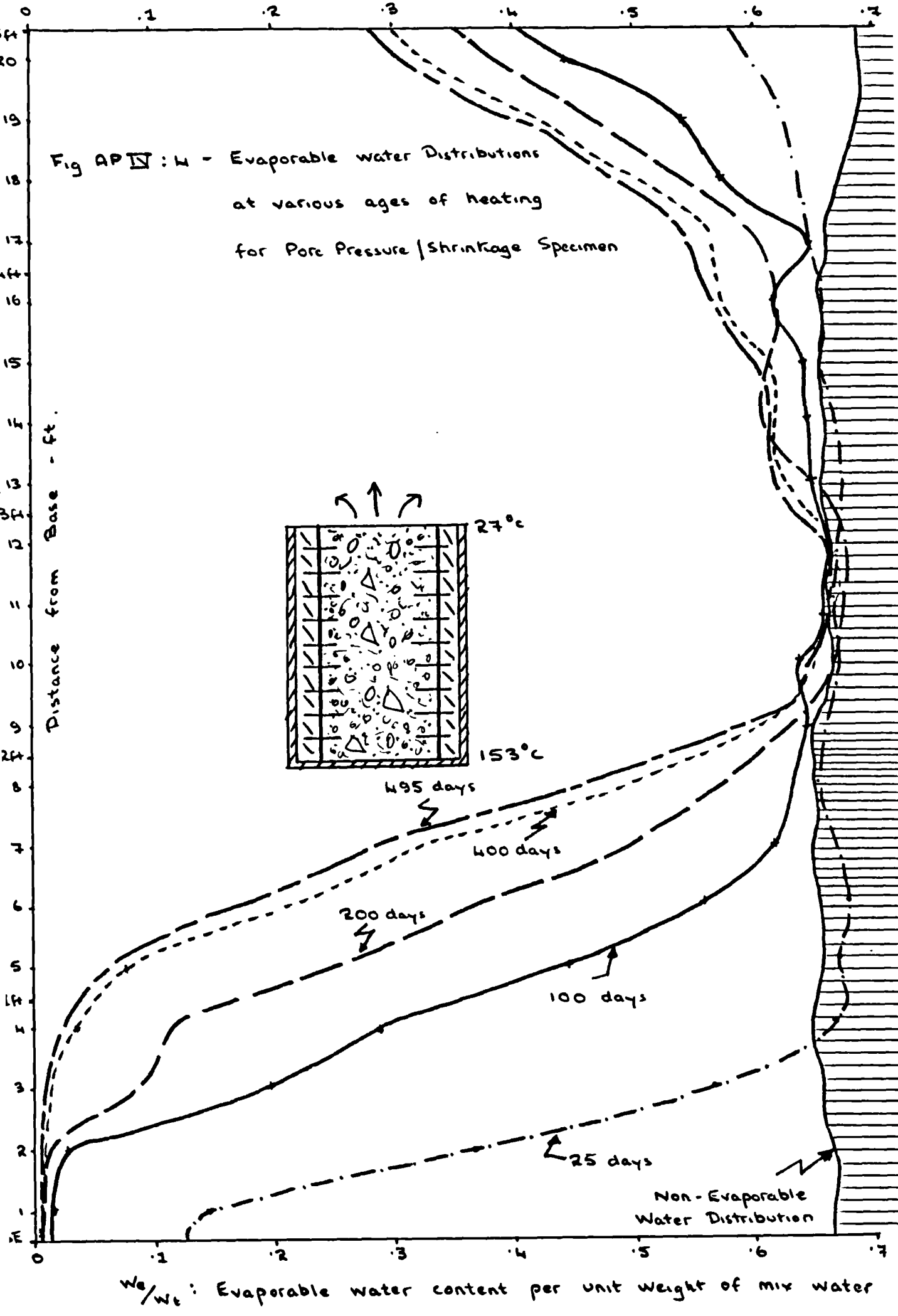
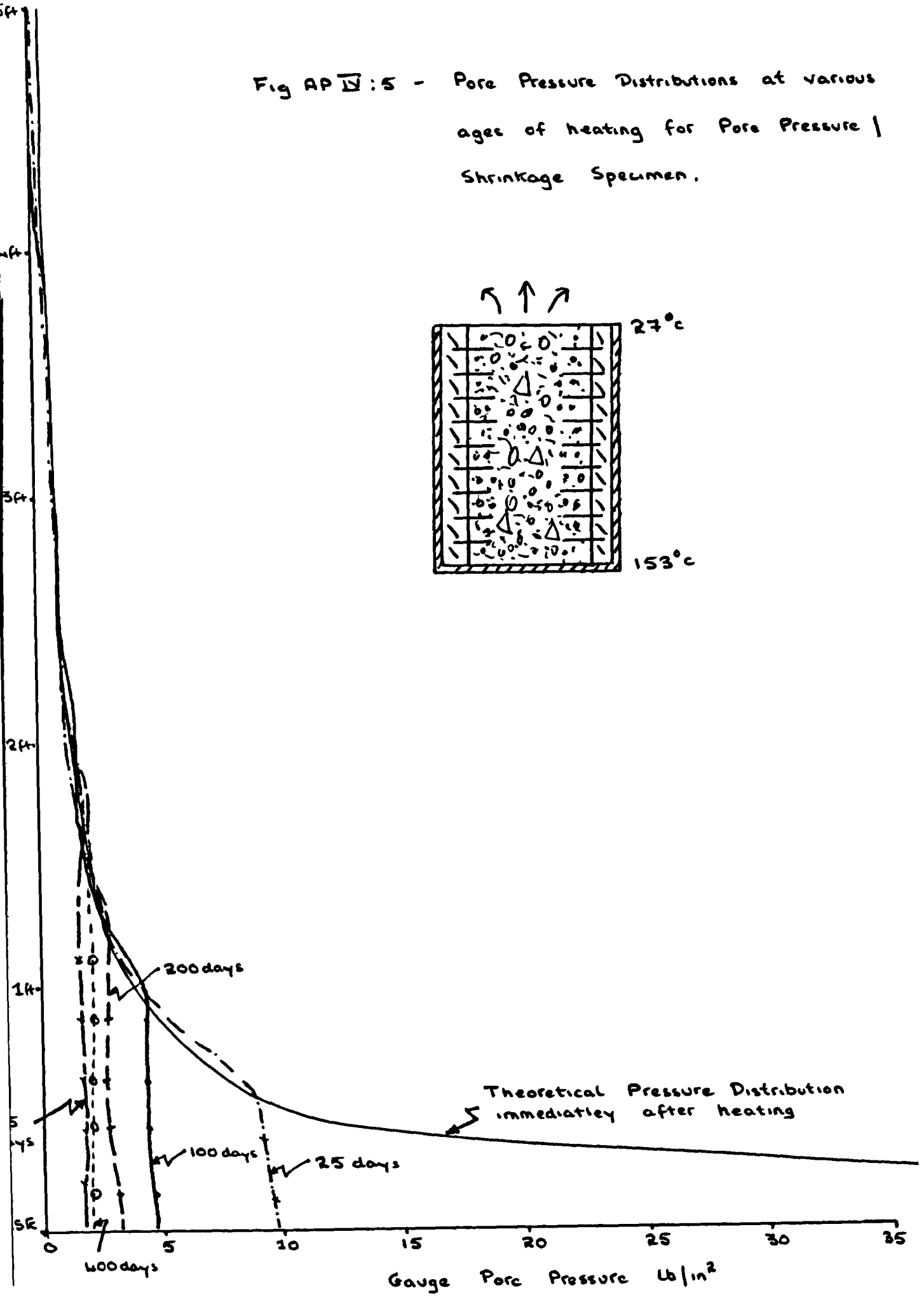


Fig APIV : 4 - Evaporable water Distributions
at various ages of heating
for Pore Pressure / Shrinkage Specimen
Distance from Base - ft.
27°c
153°c
495 days
400 days
200 days
100 days
25 days
Non-Evaporable
Water Distribution
We/Wc : Evaporable water content per unit weight of mix water

Fig AP IV : 5 - Pore Pressure Distributions at various ages of heating for Pore Pressure / Shrinkage Specimen.



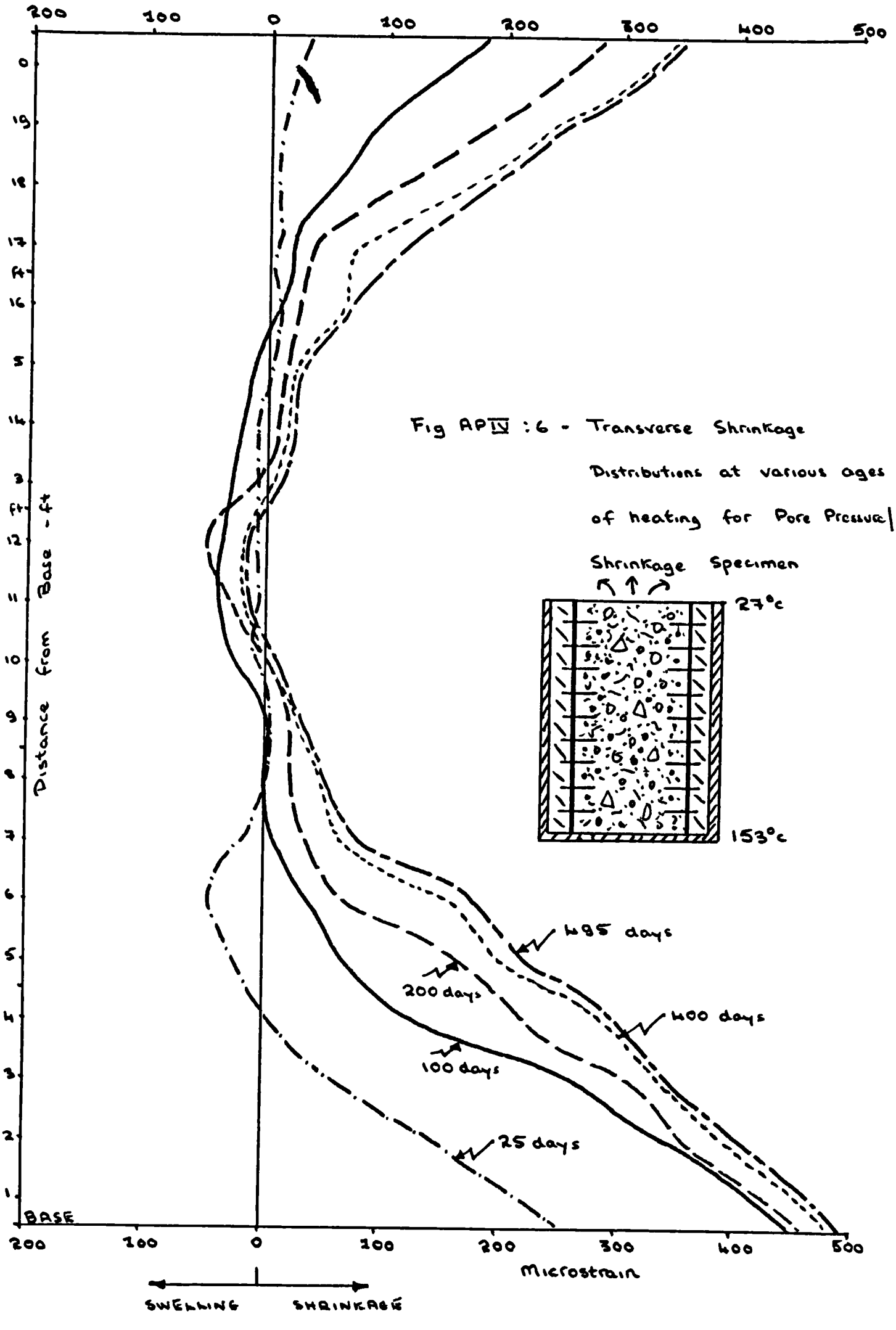


Fig APIV :6 - Transverse Shrinkage Distributions at various ages of heating for Pore Pressure Shrinkage Specimen

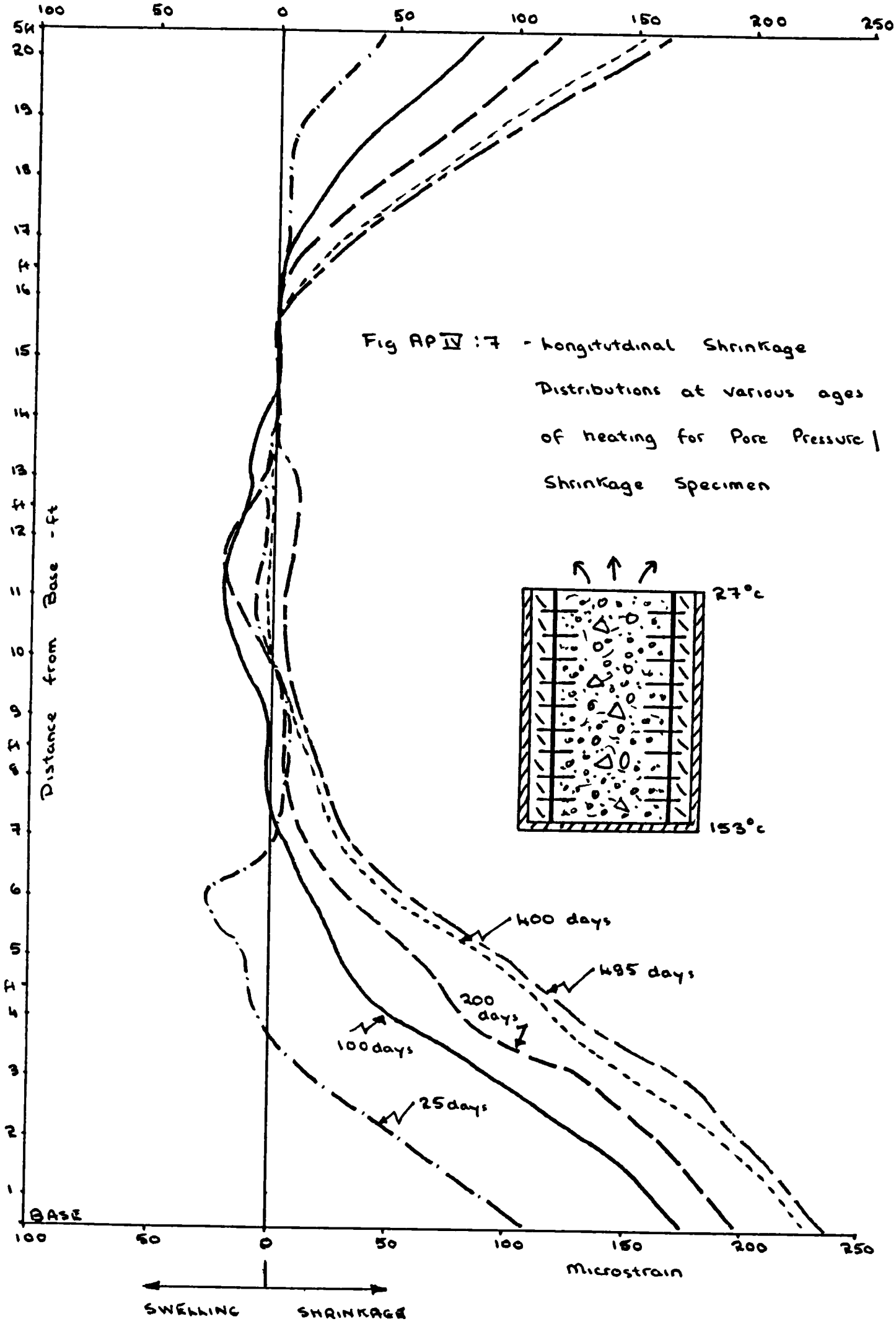


Fig APIV :7 - Longitutdinal Shrinkage Distributions at various ages of heating for Pore Pressure / Shrinkage Specimen

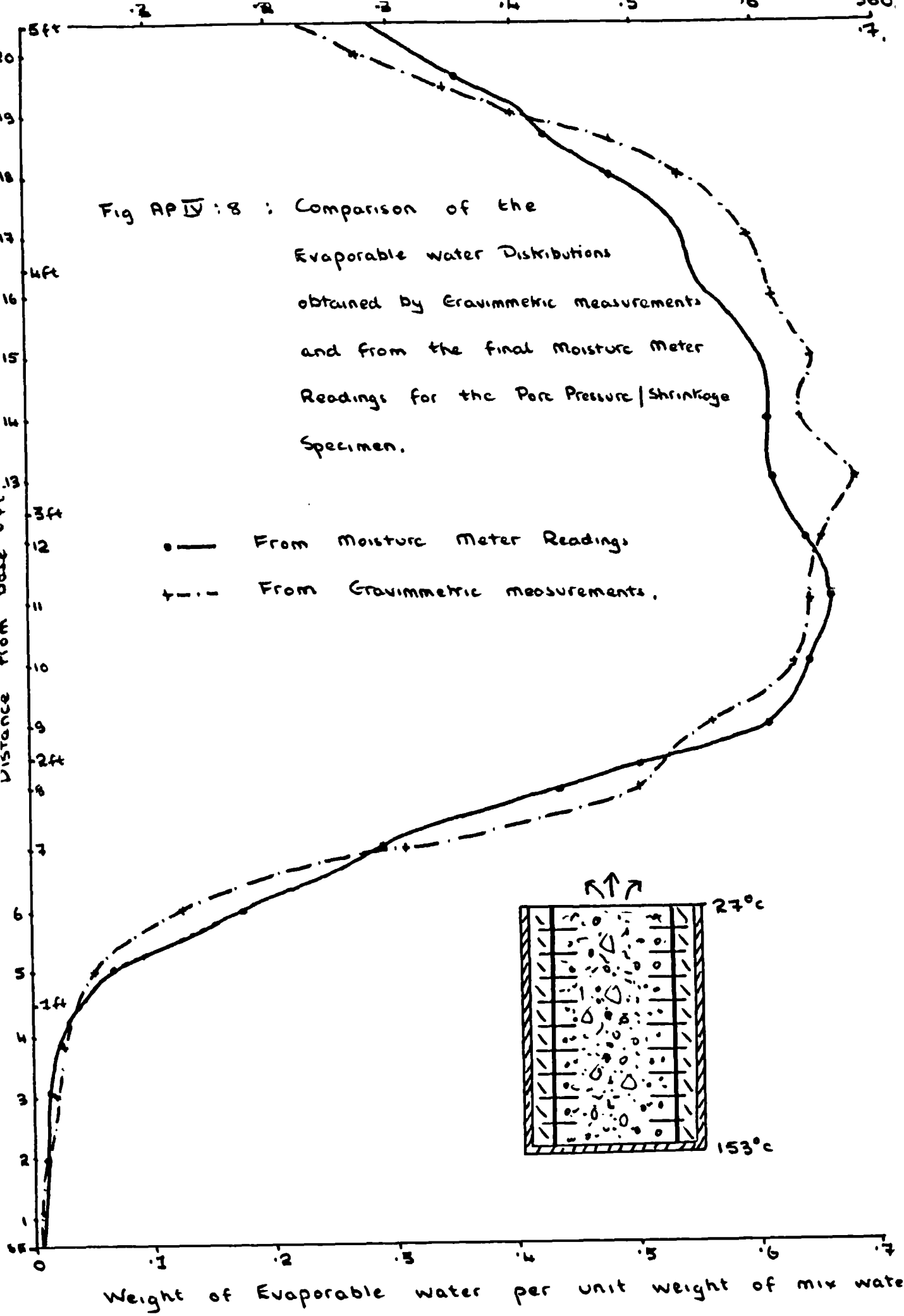


Fig AP IV : 8 : Comparison of the Evaporable water Distributions obtained by Gravimmetric measurements and from the final Moisture Meter Readings for the Pore Pressure / Shrinkage Specimen.

•—— From Moisture Meter Readings

+—·— From Gravimmetric measurements.